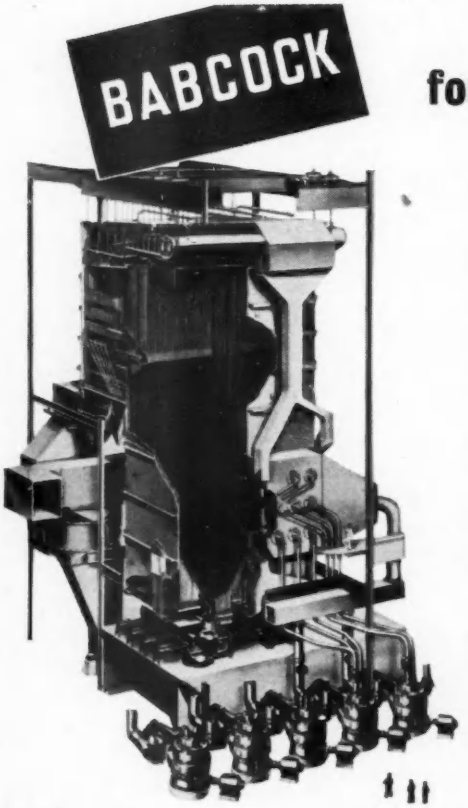
ELECTRICAL TIMES

THURSDAY
9 APRIL
1953
NINEPENCE

LARGEST BOILERS IN GREAT BRITAIN



830,000 lb./hr. 1,600 lb./sq. in. 1,060°F.

for CASTLE DONINGTON POWER STATION

BRITISH ELECTRICITY AUTHORITY
(EAST MIDLANDS DIVISION)

CASTLE DONINGTON will be the first British power station to have single boiler/turbine units of 100 MW. rating. With an evaporative capacity of 830,000 lb./hr. at 1,600 lb./sq. in. and 1,060°F., the boilers, of which *three* have been ordered from Babcock & Wilcox Ltd., will, when completed, be the largest in Great Britain.

Standing over 120 feet high from ash-basement to drum centre, they will have twin furnaces, p.f.-fired by twenty burners, fed from five Babcock type 'E' mills.

Though outstanding in size — they are one and a half times as large as any previously built in this country — their design represents a logical development, based on great experience and backed by a first class research organisation.

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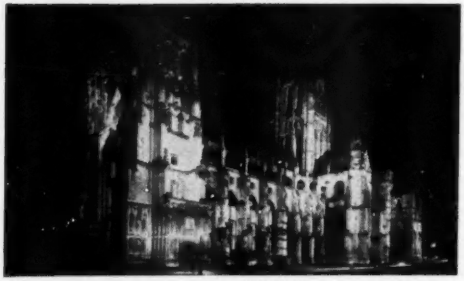
fiesta-flood

Fiesta-floods take a 300-500 watt General Service lamp, a 500 watt Glass B2 Projector lamp or a 250 watt MBT/U blended lamp

Canterbury Cathedral floodlit by Simplex flood lighting equipment



general purpose floodlights

General Purpose Floodlights (LS.50-59). Models giving narrow, wide and elliptical beams

A South London car park floodlit by Simplex Reflecto-flood floodlights

Simplex reflecto-flood

Simplex Reflecto-flood (LS.71-77) General Flood. Ideal for car parks, football grounds, swimming pools etc

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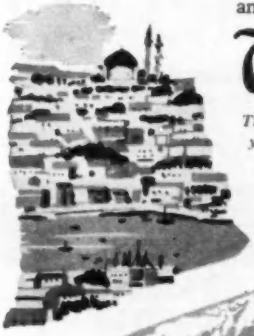
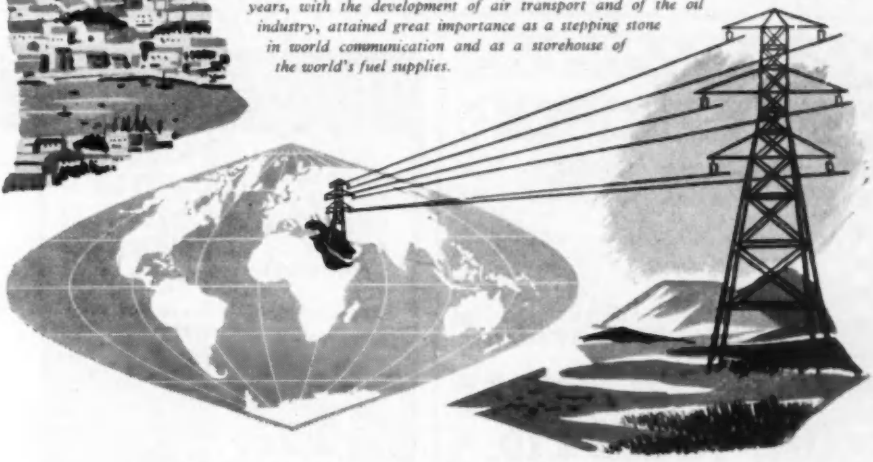


The Near East

This area of the globe—traditionally the cradle of Western civilisation—has of recent years, with the development of air transport and of the oil industry, attained great importance as a stepping stone in world communication and as a storehouse of the world's fuel supplies.



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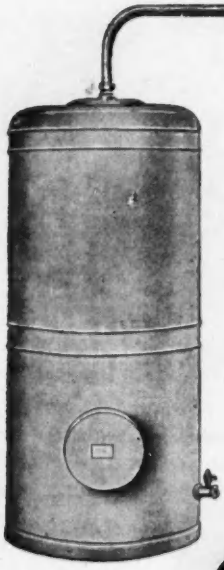

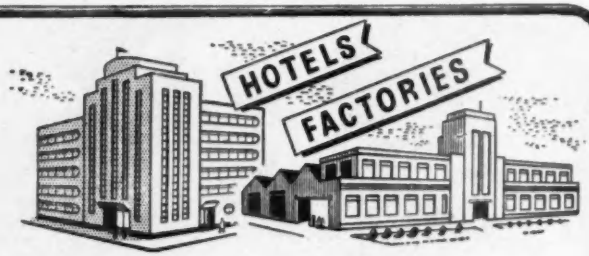

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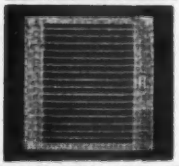

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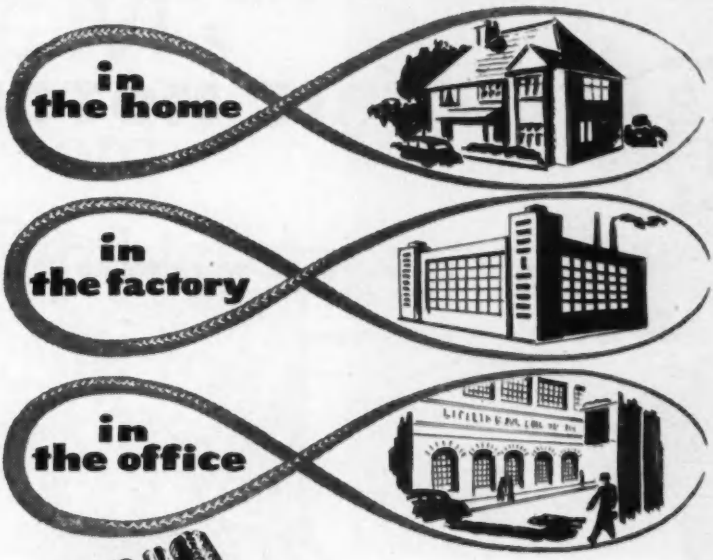

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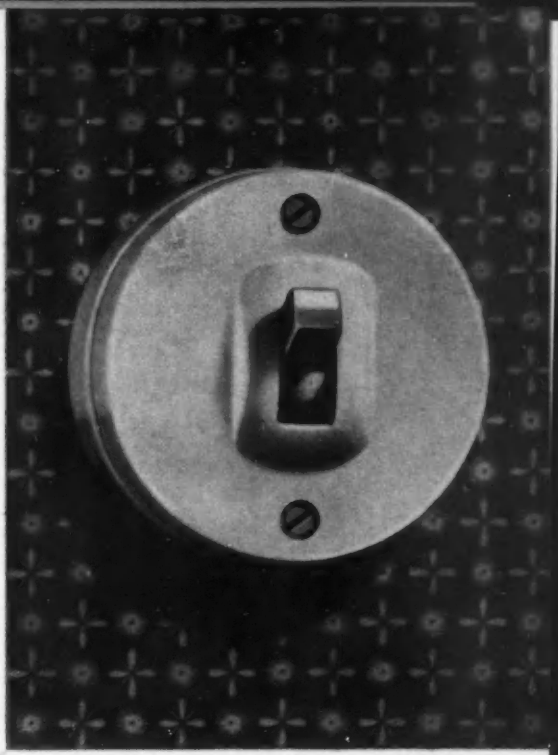

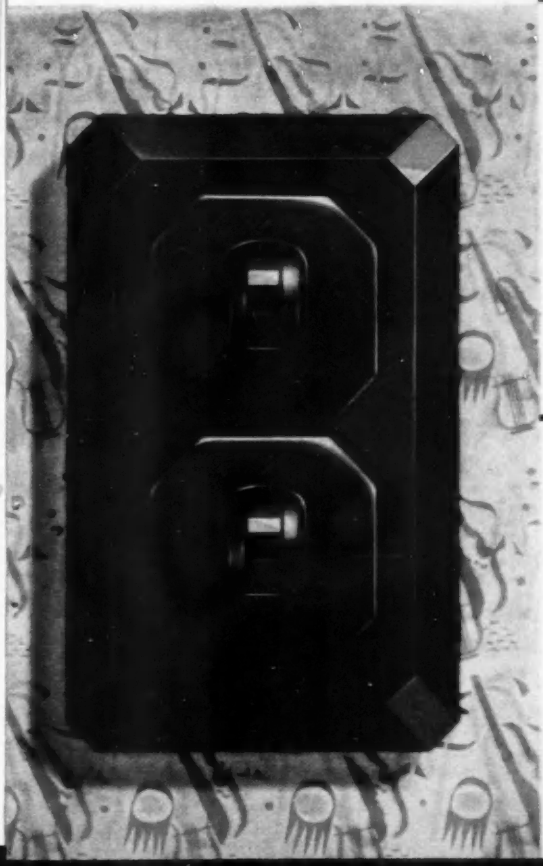

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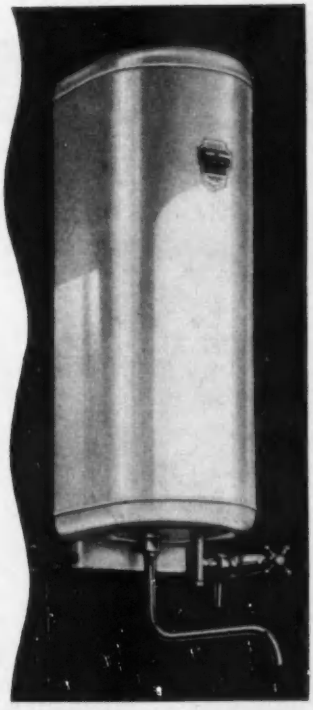

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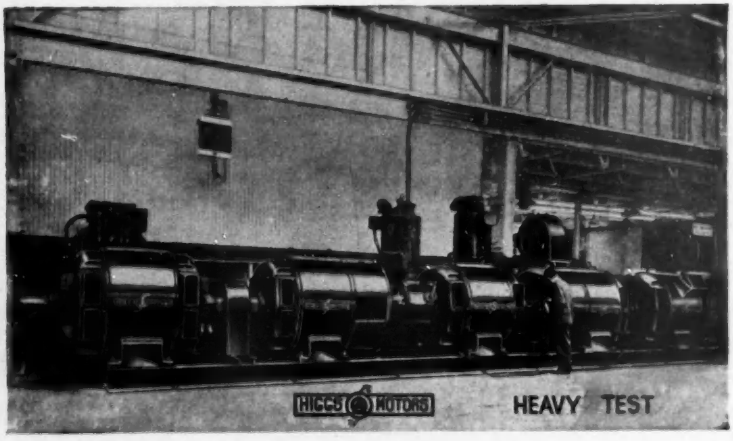

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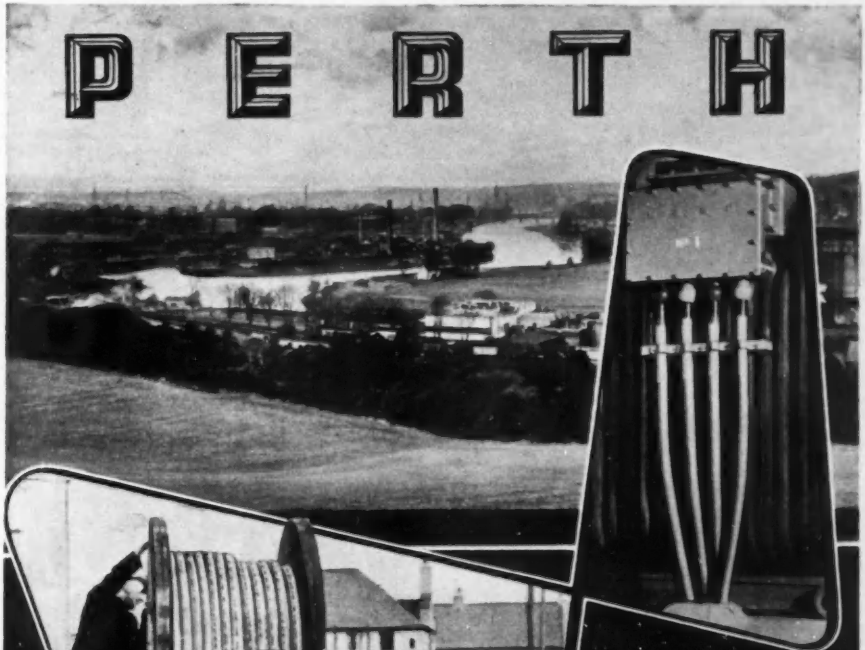

The inset photographs show work recently carried out by Scottish Cables Contracts Department for the North of Scotland Hydro-Electric Board in connection with the Perth D C — A C changeover.

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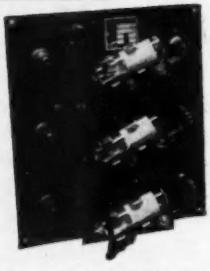

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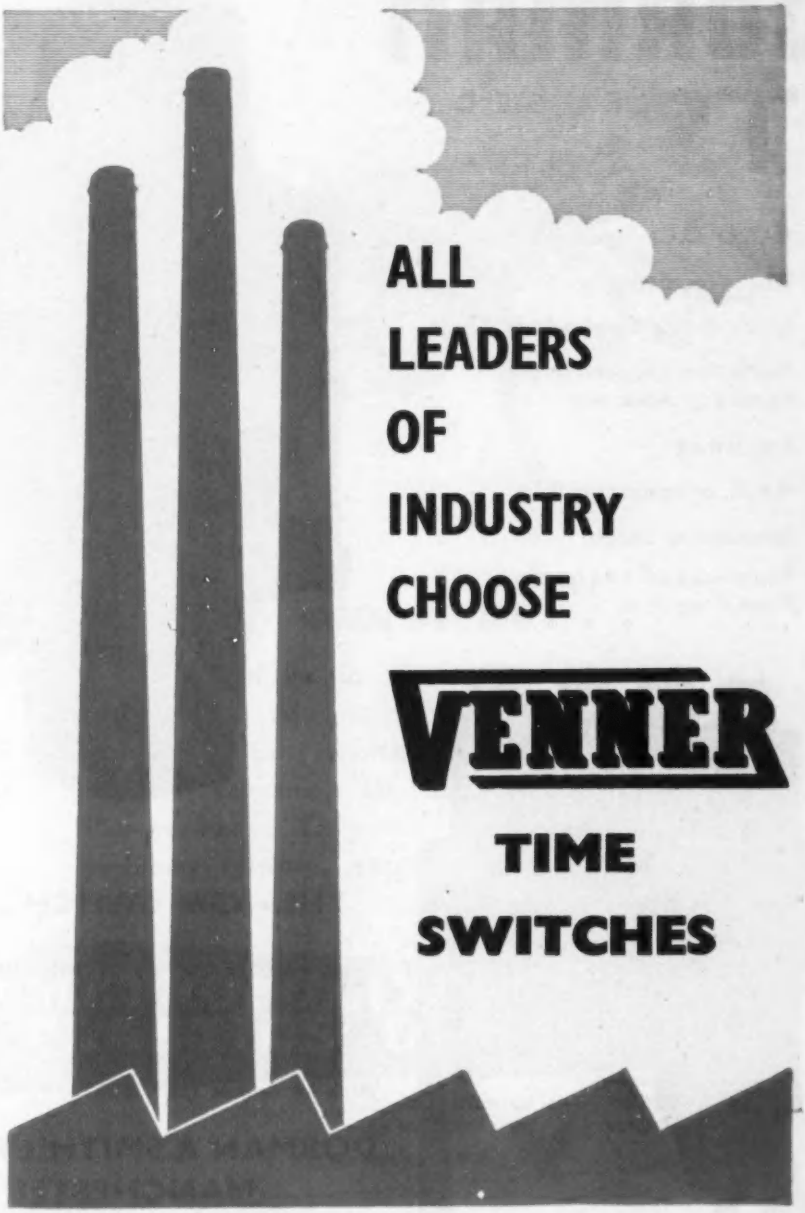

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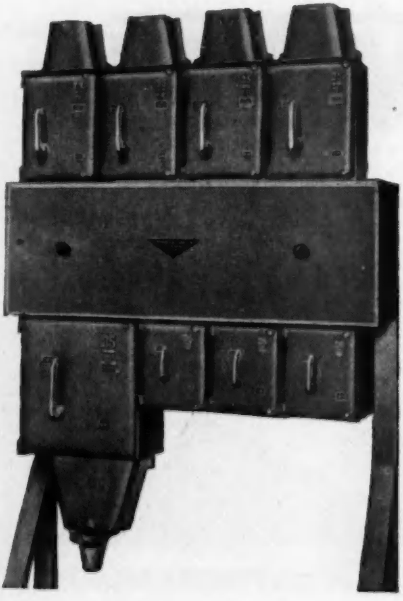

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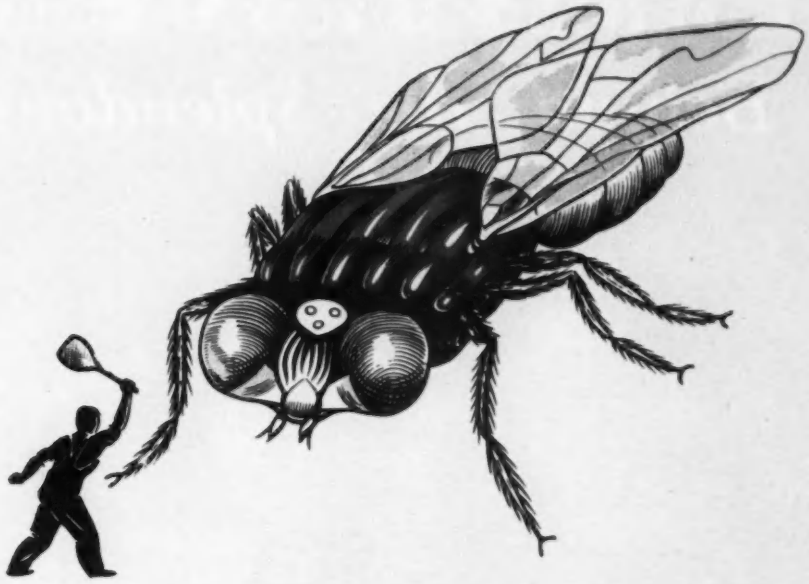

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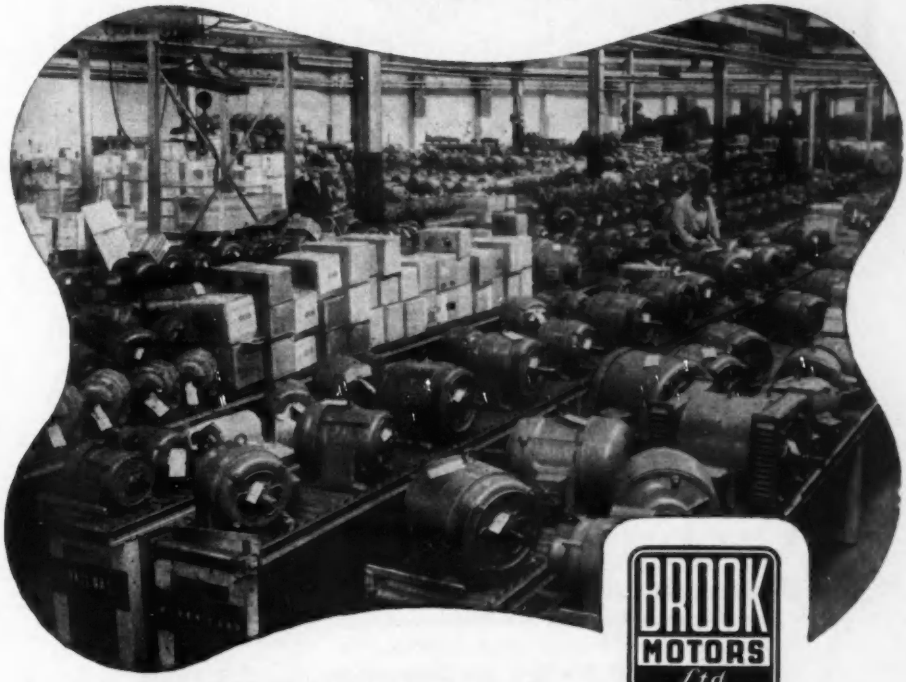

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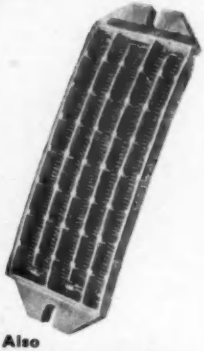

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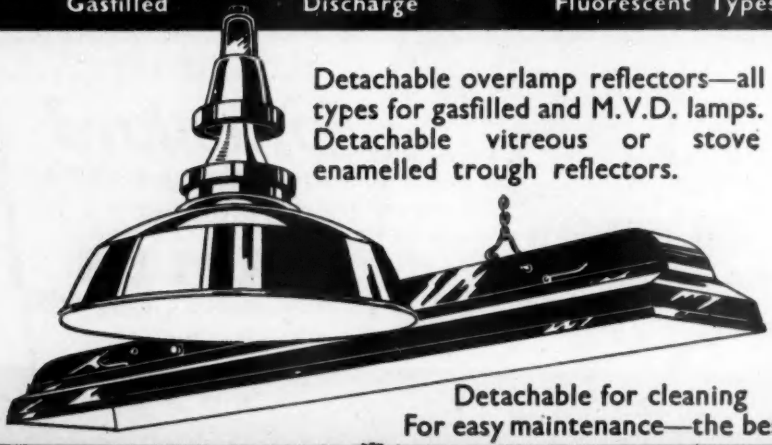

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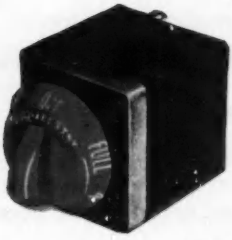
The Sunvic one-circuit Radiant boiling plate



— and The "Simmerstat"

BRITISH INSTRUMENT INDUSTRIES EXHIBITION
OLYMPIA-LONDON
JUN.30-JUL.11'53
STAND Nº 5 E

the *inevitable* answers to:—

- **Lower first costs**
- **Lower maintenance costs**
- **Lower consumption**
- **Perfect performance for all cooking needs**

Sunvic one-circuit Radiant Boiling Plates are available in 6½" and 8" sizes. Ask for leaflet BP 10.

SUNVIC CONTROLS LTD., 10 ESSEX STREET LONDON, W.C.2 *Member of the A.E.I. Group of Companies*
SALES AND ENQUIRIES: 132/135 LONG ACRE, LONDON W.C.2
Telephone: TEMple Bar 9591

SUNVIC

TAS/SC272A

GENERALLY SPEAKING . . .

as a butt is

to a bucket . . .

— so is a GENERAL V.I.R. lead-sheathed and armoured cable to a GENERAL cotton-and-silk Flexible. And these are merely two of the wide range of cables manufactured by GENERAL for every job of carrying electric current. In the matter of capacity, GENERAL CABLES have not only *all* the answers but the right ones . . . cables of quality, strength and durability justifying our claim that "General Cables today prevent trouble tomorrow."

GENERAL CABLES

MADE AT LEATHERHEAD

V.I.R. Taped, Braided and Compounded.
V.I.R. Lead Sheathed.
V.I.R. Tough Rubber Sheathed.
V.I.R. and Armoured.
Polythene insulated P.V.C. Sheathed Cables and Flexibles.
T.R.S. Flexibles.
Cotton and Silk Flexibles.
Workshop Flexibles.
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The General Cable Manufacturing Co. Ltd., Leatherhead, Surrey. 'Phone: Leatherhead 3021/4.
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Depots at: 204/206 Newhall St., Birmingham. 54a Newton St., Manchester. 55/63 Washington St., Glasgow, C.2.

cleaning up fuse-board design

The New 'SUPERFORM'

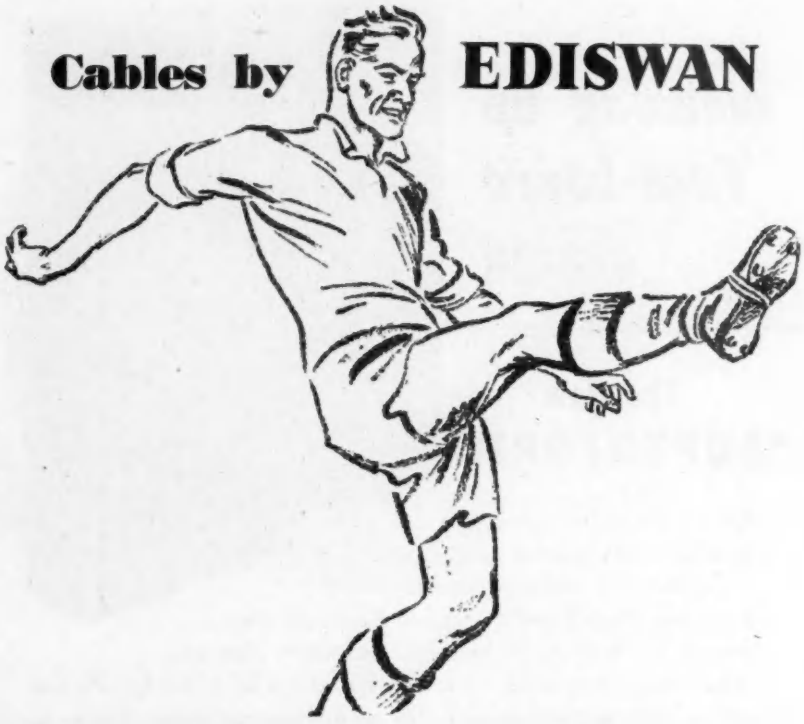
The new 'Superform' fuse-board possesses all the essential rigidity and is enclosed in a handsome, smooth shell of sheet steel which makes it dirt and dust-proof. The door is held tight by an automatic, push-button catch and, unless shut properly, swings wide open. It can never be left slightly ajar, allowing dirt to collect in the fuse-board. This greatly improved design includes an internal insulating barrier, easily removed for cabling. All 'Superform' fuse-boards are stove enamelled and with their unbroken contours are very easy to keep clean. They incorporate 'ENGLISH ELECTRIC' High Rupturing Capacity non-deteriorating cartridge fuse links complying with B.S.88 : 1947.
Prices and leaflet giving full details of range sent on request.

'ENGLISH ELECTRIC'
fusegear

THE ENGLISH ELECTRIC COMPANY LTD., QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Fusegear Works, East Lancashire Road, Liverpool, 10
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON
F.10

See the English Electric Advertisement for Domestic Appliances which appears on page 65 of this issue.

Cables by EDISWAN



To avoid overcrowding at St. James Park, Headquarters of Newcastle United F. C., automatic spectator control equipment has been installed. A central indicator panel gives the number of persons that have passed in to the various sections of the ground. Warning signals are automatically given at entry turnstiles when the maximum number has been admitted and the affected sections are closed. In the complex system of connections linking the 52 turnstiles with Control, more than 18 miles of Ediswan rubber insulated cable has been used — it maintains GOOD connections.

One of the central indicator panels linking together the 52 turnstiles.

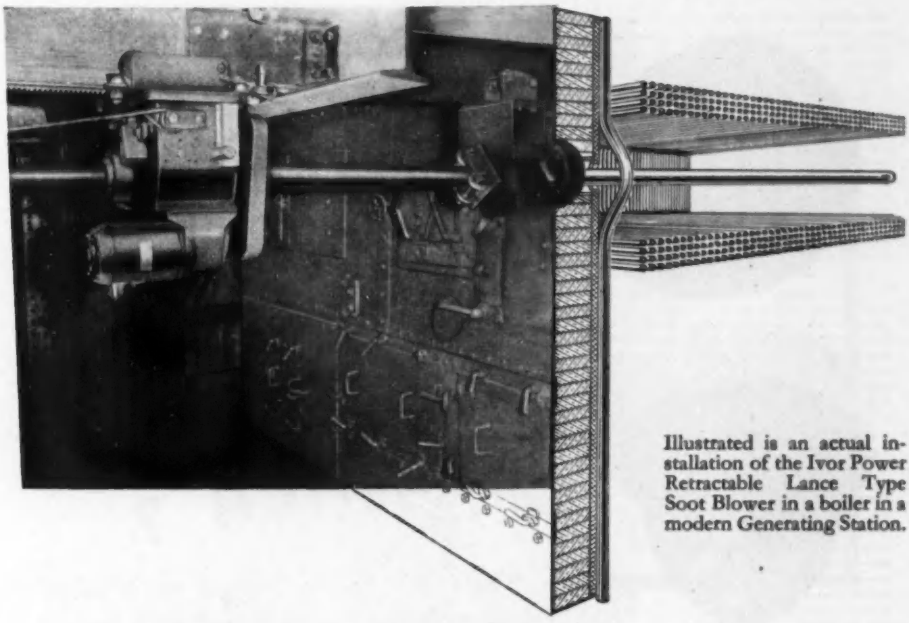
Automatic spectator counting equipment by Automatic Turnstile Control, Ltd., Nottingham.

Electrical installation by Fletcher Bros., Newcastle-on-Tyne.

The Edison Swan Electric Co. Ltd., 155 Charing Cross Road, London, W.C.2

Member of the A.E.I. Group of Companies

G 67



Illustrated is an actual installation of the Ivor Power Retractable Lance Type Soot Blower in a boiler in a modern Generating Station.

Performance Plus

The outstanding success of the long Retractable Lance Type Soot Blower, perfected and proved by the Ivor Power Specialty Co. Ltd., and now acknowledged to be the most effective blower for large boilers, sets the seal of efficiency in the cleaning of boiler and superheater tube surfaces in high temperature zones.

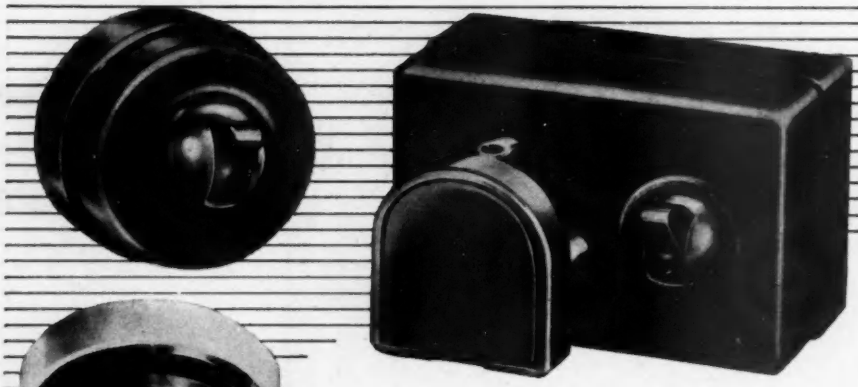
Upon their ability to fulfil completely the requirements demanded by present day operating conditions, these blowers are now being fitted to boilers in an increasing number of the most modern Generating Stations.

Ivor Power Lance Type Soot Blowers can be arranged for individual or fully automatic electrical sequence control.

IVOR

IVOR POWER SPECIALTY CO. LTD.

29 WOBURN PLACE, LONDON, W.C.1
and ABERDARE, GLAMORGAN, S. WALES



WHICH ?

There are various ranges of TEMCO Accessories but you will find each range a master of its kind. All embody the latest TEMCO advances, are highly efficient and will give long service. Prices are strictly competitive.

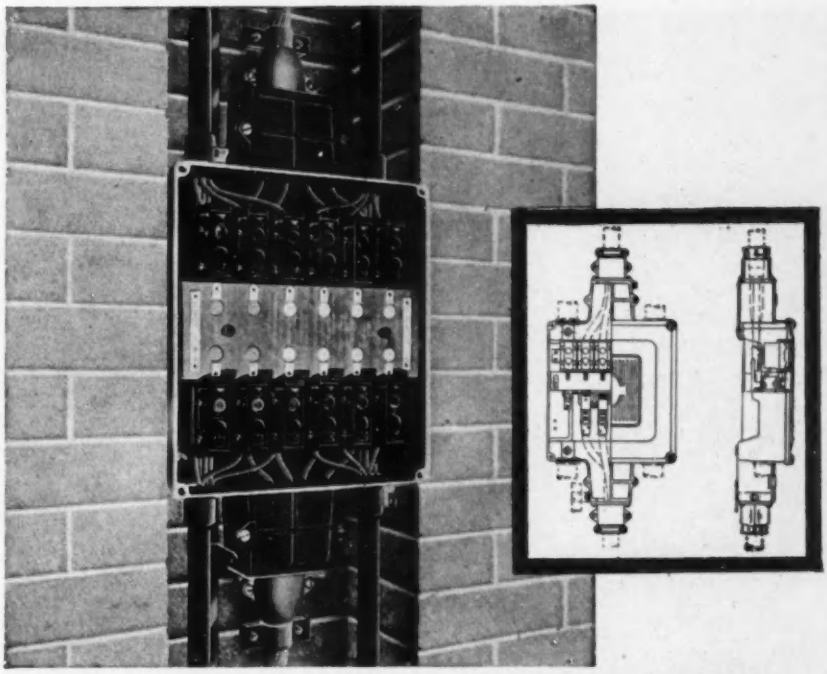
We invite you to write for a copy of our complete Accessory Catalogue.

THE MASTER OF SWITCHES

TEMCO

ELECTRICAL ACCESSORIES

T.M.C.-HARWELL (SALES) LTD
37 UPPER BERKELEY STREET, LONDON, W.1
Telephone : Paddington 1867/8/9



for Electrical Distribution in Buildings

BICC RISING MAIN BOXES

BICC Rising Main Boxes are made in cast iron and are designed for speedy installation. They fit into a chase of standard brickwork dimension (13½" x 4½") and are an economical form of distributing up tc twelve single-phase or four three-phase circuits from a four-core rising main.

The H.B.C. Fuse-links provided are rated up to 60 amperes, category of duty 250 A.C.4 or 440 A.C.4 (B.S.88 : 1947 and B.S.1361 : 1947), these being of the well-known E-type having a high degree of discrimination.

Provision is made for terminating and sealing paper insulated (lead or aluminium sheathed) rising main cable which it is recommended should be of the BICC Patented Mass-impregnated Non-draining type.

Further details are contained in Publications :

No. 230 Rising Main Boxes.

No. 252 High Breaking Capacity Fuse-links.

No. 308 Mass-Impregnated Non-draining Cables.

BRITISH INSULATED CALLENDER'S CABLES LTD. BI Callender's 21 BLOOMSBURY STREET, LONDON, W.C.1

AS CERTAIN AS THE COMING OF SPRING

If the mains should fail, the **Nife-Neverfayle emergency lighting equipment** will instantly, automatically flash into action with complete reliability. That is the special advantage of the NIFE battery. For a NIFE battery will not deteriorate even during months of inactivity—its electrolyte is almost inert. A NIFE battery can stand up to rough handling and neglect—it is made principally of steel. And finally, a NIFE battery's first cost is almost its last cost—it needs practically no attention. Hospitals and cinemas all over the world have already installed Nife-Neverfayle emergency lighting equipment.

N.17

NIFE-NEVERFAYLE

THE EMERGENCY LIGHTING EQUIPMENT

with the STEEL battery

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE

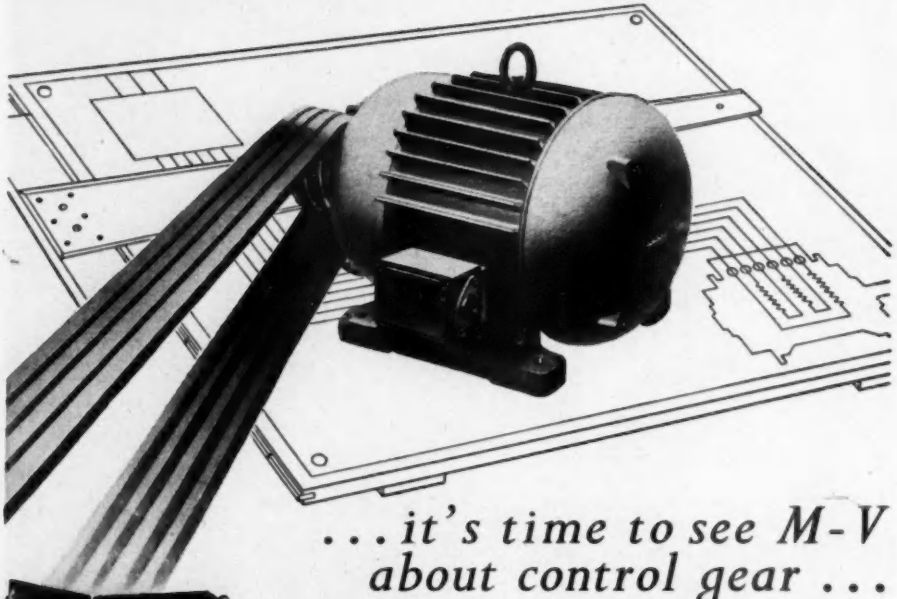
An Artist's impression of the new Thames Wire & Cable factory at Hoddesdon.

THAMES WIRE & CABLE CO. LTD.,

BREWERY ROAD, HODDESDON, HERTS.

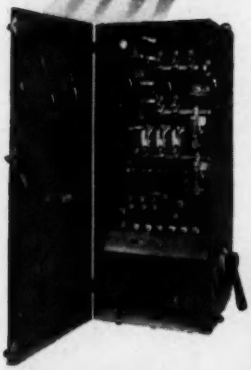
'Grams: Thames, Hoddesdon. *'Phone:* Hoddesdon 2485.

When a Motor Drive is on the drawing board ...

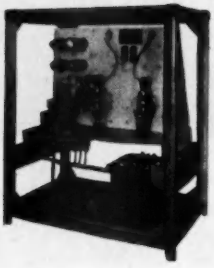


... it's time to see M-V about control gear ...

When you are thinking of installing a motor, think also of Metrovick control gear. Trouble, time and cost are saved by consulting M-V when a motor drive is in the planning stage. M-V design and build all types of control gear from switch-starters for fractional hp motors to elaborate electronic controls for complex industrial processes. The experience of M-V engineers therefore covers the complete range of control gear and their practical advice is at your service.



M-V Stator-rotor Contactor Starter



M-V Electronic Speed-control Equipment

M-V Hand-operated Oil-break Starter

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17.

Member of the A.E.I. group of companies

METROVICK *Control Gear for all Motor Drives*

H/A 005

. . . and come flow,
come flood, the
DAVENSET AUTOMATIC PUMP
will never "turn turtle"

- **COMPLETELY AUTOMATIC**
- **LOW RUNNING COSTS**
- **NO MAINTENANCE REQUIRED**
- **MERELY PLACE IN FLOOR SUMP**

IDEAL for flooded basements, beer cellars, etc. It operates with a 4½ in. rise or fall of water in the sump, or can be completely submerged in water. Requires no elaborate fitting. The Davenset Automatic pump will run continuously for three or four hours on one unit of electricity. Designed to operate against a maximum head of 20 feet.

DAVENSET AUTOMATIC PUMP

For further details, write to—

ANOTHER DAVENSET PRODUCT
BUILT FROM THE FIRST—TO LAST

PARTRIDGE WILSON & CO. LTD. DAVENSET ELECTRICAL WORKS. LEICESTER. 5

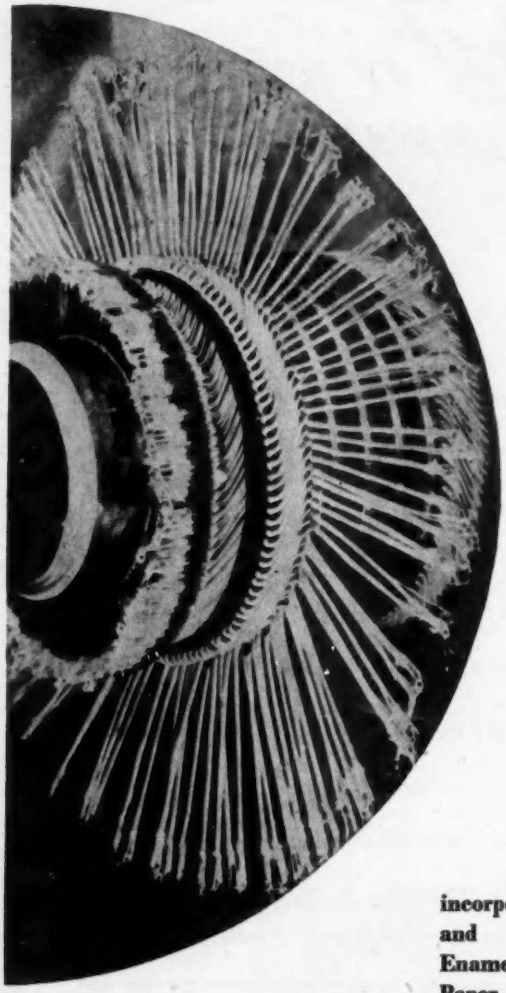


Photo by courtesy of Globelite Industries Ltd.

meet the exacting conditions in the electrical industry

with "LEWCOS" insulated winding wires and strips.

The "LEWCOS" range incorporates all known coverings and combinations including:— Enamel, Lewmex, Silk, Rayon, Paper, Cotton, Asbestos and Glass.

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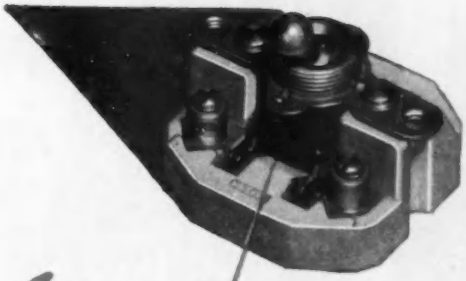
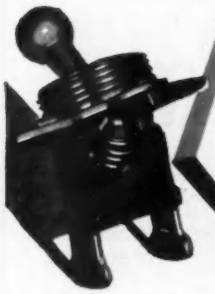
THE LONDON ELECTRIC WIRE COMPANY AND SMITHS LIMITED, Leyton, London, E.10

Incorporating FREDERICK SMITH AND COMPANY
Associated with THE LIVERPOOL ELECTRIC CABLE COMPANY LIMITED and VACTITE WIRE COMPANY LIMITED



Nylon ENTERS THE TUMBLER SWITCH

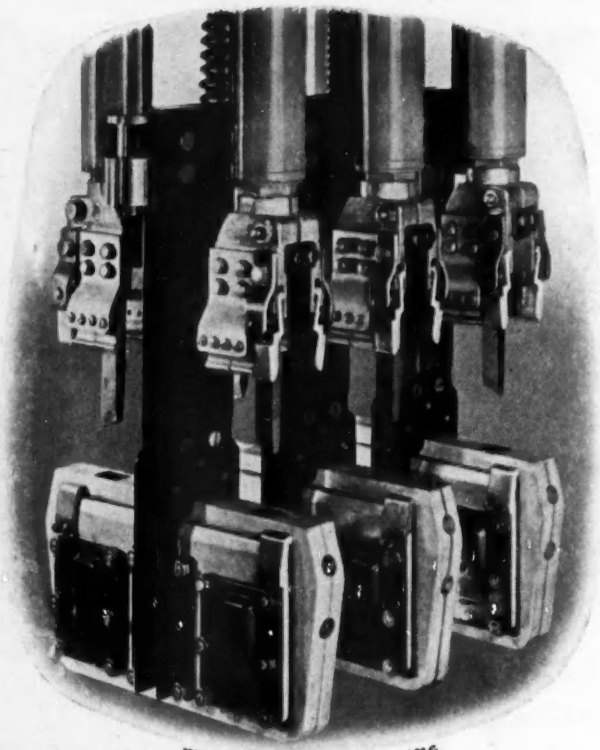
NYLON has appeared as a contact carrier in Crabtree Type AC-DC one and two way metal flush switches and will ultimately replace mica in all Crabtree switches. If you would like to see for yourself how tough, hard-wearing and resilient is this new form of internal insulation — we should be delighted to send you a nylon contact carrier, post free and with our compliments, if you will ask us for one (on your business letter paper).



Crabtree

A name synonymous with Progress in Accessories and Switchgear

"Crabtree" (Registered) C. 667/171 Advt. of J. A. Crabtree & Co. Ltd., Walsall, Staffs., England



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THE CATON

***ArcTrap* CIRCUIT BREAKER**

★ Proved and acknowledged as one of the most outstanding developments in the technique of arc control.

★ The illustration shows a 250 MVA, 6/11 kV Circuit Breaker with oil tank removed. ● Level characteristic of arcing 10% to 100%. Average arc length 0.85".

★ Now in service and full production from 250 MVA, 6.6kV to 500 MVA, 22kV.

YORKSHIRE SWITCHGEAR
& ENGINEERING COMPANY LIMITED
LEEDS AND LONDON

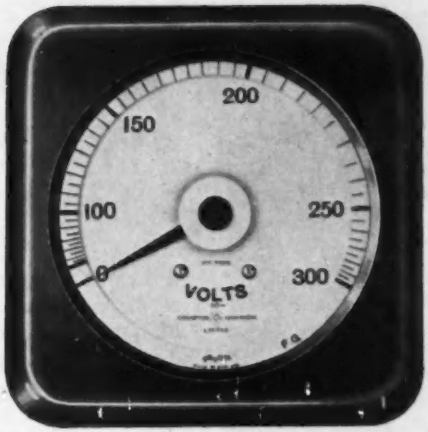
B.I.F. BIRMINGHAM STAND C.419

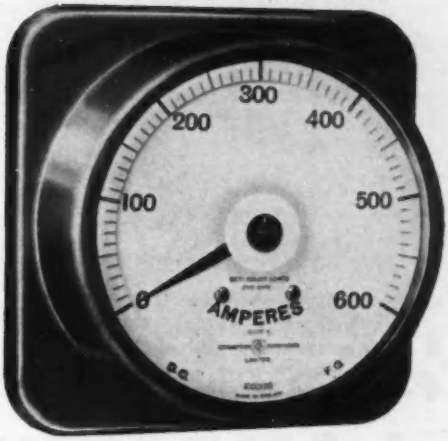
NOW in 4" and 6" dial sizes

CROMPTON PARKINSON CIRCULAR SCALE INSTRUMENTS

Here they are—the 4 inch and 6 inch versions of the new circular scale instruments with 240° scales and plastic cases.

The 4 inch dial has a 7 inch scale and the 6 inch a 10 inch scale. This provides the ease and accuracy in reading of far larger instruments and the added advantage of neat, modern looks. Specify them in moving coil (D.C.) and moving iron (A.C.) types for all normal ranges wherever neatness and saving in weight and bulk are desired.





ALL THESE ADDED ADVANTAGES

- Shock-resisting movement with sprung jewels.
- Light weight plastic case as robust as cast iron.
- Removable bezel makes one design suitable for either flush or projection mounting.
- Platform scales give freedom from parallax.
- Cases are uniform in appearance with existing range of C.P. instruments including wattmeters, frequency meters, P.F.I.s and synchroscopes.

Send for List today

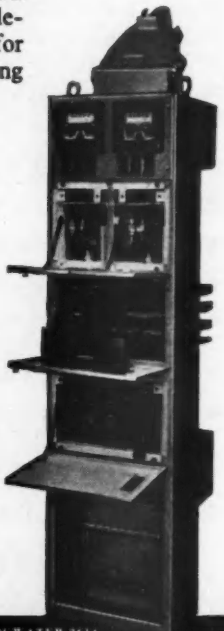
Crompton Parkinson LIMITED

CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

'Phone: CHAncery 3333 'Grams: Crompark, Estrand, London

ELECTRICAL EQUIPMENT

Attractive . . space saving . . reliable, these are the features of the new Lancashire Dynamo Heavy Industrial Flush Mounting Switchboards. Based upon the unit principle, these modern switchboards are specially designed for distribution of low tension electrical energy for all industrial applications. The mechanism is identical to that used in Lancashire Dynamo H.I. Switchgear, which has been tested and certified by an independent International Authority for service under 25 mVa rupturing capacity conditions.



- **One standard size of cubicle.**
- **Complete switchboards available to customers specifications.**
- **Drop down, hinged fronts.**
- **Fully interlocked for safe operation.**
- **Extensions on site quickly and easily carried out.**

LANCASHIRE
DYNAMO
SWITCHGEAR LIMITED

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'GRAMS CRYPTOQUIP BRIDGWATER
A MEMBER OF THE LANCASHIRE DYNAMO GROUP OF COMPANIES

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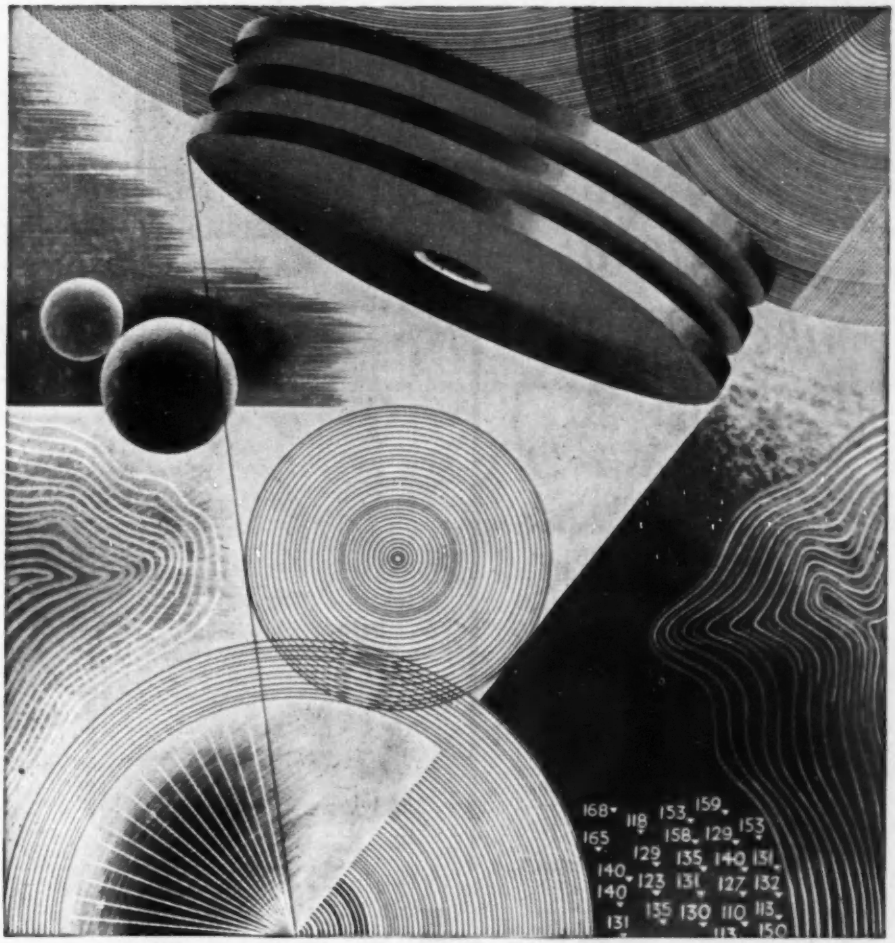


Gears without Teeth

Shell research people are constantly experimenting to find even better lubricants for use in gears. For specialised wear study, four-ball and two-ball machines simulate ingeniously the combined rolling-sliding motion that occurs in gear tooth engagement.

In another machine spinning bronze discs in loaded contact give an accurate representation of wear on gears in actual service. Speed, direction of rotation and diameter of the discs can be varied to allow for the wide variety of conditions found in practice.

What happens to oils in high-speed gears? That problem is studied at Thornton in gear rigs which turn at up to 15,000 r.p.m.

Shell research is not a rapid process because any one result has to be tested again and again, in theory and practice, before it is allowed to stand. The Shell Lubricant in *your* gears is the result of this kind of research-in-depth.

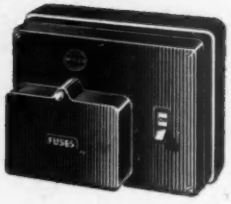
SHELL LEADERSHIP IN LUBRICATION

C

Your Electrician likes it, too

The wiring of the Wylex Fuse Unit is easy because the connections are easy to get at and there is plenty of room. There is no "blind" wiring.

You will appreciate too, the high quality that makes sure you install a trouble-free job.



4 Way

6 Way

8 Way

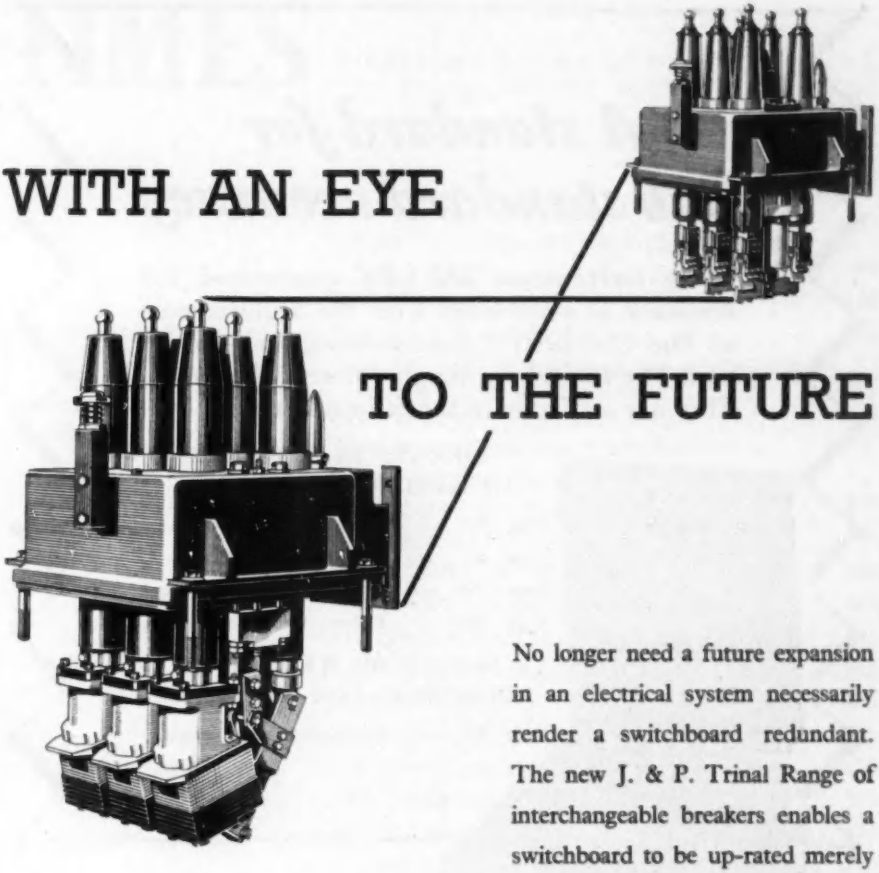
Wylex

SWITCH FUSE CONTROL UNIT

Write for New Catalogue:–

GEORGE H. SCHOLES & CO. LTD., Wylex Works, Wythenshawe, Manchester.

WITH AN EYE TO THE FUTURE



No longer need a future expansion in an electrical system necessarily render a switchboard redundant. The new J. & P. Trinal Range of interchangeable breakers enables a switchboard to be up-rated merely by inserting higher rated breakers. J. & P. standardisation can mean a big financial saving. Ask for Publication SG 86 for full details.

J. & P. Trinal Breakers and Oil Switches conform strictly to relevant B.S. Specifications, including B.S. 116, and are, of course, A.S.T.A. certified where applicable. Maximum rating, 250 MVA at 6.6 kV.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

A standard for Sub standard accuracy

These instruments are fully guaranteed for accuracy in accordance with the requirements of The Electricity Commissioners, and comply with The Electricity Supply (Meters) Act, 1936. They are available in the following types.

MOUNTED IN PORTABLE POLISHED TEAK CASES

Type FS	—	Single phase, single range.
Type FS	—	Single phase, multi range.
Type FST	—	3 phase, 3 wire, single range.
Type FST4	—	3 phase, 4 wire, single range.

SERVICE OR WALL TYPES MOUNTED IN CAST IRON CASES

Type FS	—	Single phase, single range.

Chamberlain & Hookham

ROTATING *Sub-Standard* **METERS**

CHAMBERLAIN AND HOOKHAM LTD., BIRMINGHAM

ELECTRICAL TIMES

Volume 123 No. 3205 9 APRIL, 1953

PUBLISHED EVERY THURSDAY

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ELECTRIC COOKERS—THE CASE FOR SIMPLE HIRE, by N. F. Marsh	665
E.L.F.A.'s WORK IN 1952	668
IN DEFENCE OF ASSOCIATIONS	668
THE PRINCIPLES OF POLYPHASE A.C. COMMUTATOR MOTORS, by J. L. Watts, A.M.I.E.E.	669
TRANS-FRONTIER POWER EXCHANGES	674
PROBLEMS AND PRACTICE IN ENGINEERING	675
MAGNETISING INRUSH CURRENTS IN TRANSFORMERS, Part II, by K. W. E. Gravett, M.Sc.(Eng.)	677
CALCULATING R.R.R.V.	681
POWER SUPPLY FOR PRECIPITATORS	682
HYDRO POWER IN CANADA	683
THE EFFICIENCY RACE	684
COAL HANDLING ON A GRAND SCALE	685
OVERSEAS NEWS	686
PERSONALITIES IN THE INDUSTRY	688
THE BUYER'S COLUMN	691
NEW LITERATURE	693
BRITISH STANDARDS	694
THE WEEK IN NEWS	695
Questions in Parliament	699
Company Activities	700
Electric Supply News	701
COMMERCIAL INFORMATION	702
CLASSIFIED ADVERTISEMENTS	49
INDEX TO ADVERTISERS	56

ESTABLISHED 1891

SUBSCRIPTION RATES—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies are obtainable, price 9d. each.

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use G.E.C.

ELECTRIC Process Heating

FURNACES · INFRA RED · HIGH FREQUENCY

● **Bold thinking about bigger production demands new methods of heat treatment. G.E.C. *electric* process heating ensures maximum output and true economy. The many heating equipments in its range are clean, safe, simple to operate and heat rapidly to constant, correct and controlled temperatures. Its versatility is being proved every day.**

● **It is widely used in heavy and light industry, and a typical example of its versatility is shown here.**

● **G.E.C. has had many years' experience in the design and construction of heating plant. The Company's specialists welcome opportunities to discuss potential uses.**

High Frequency Heating

The G.E.C. 2 KW INDUCTION HEATER has many features which make it eminently suitable for a wide range of applications, including the hardening of small parts, soldering and brazing. A typical instance of its value is illustrated above. When a gas flame was used to braze the box yoke, the spread of heat caused such distortion that it was necessary to mill the top face and to redrill the holes. Both these operations were avoided by using G.E.C. H.F. Induction Heating, and output was increased by 280%

● **ELECTRICITY ENSURES TRUE COAL ECONOMY**

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Editorial

FUEL IS FAVOURABLE

AFTER a winter that has been notable for its long-continued rigour, if not for extreme severity of weather, there is both satisfaction and relief in noting that coal stocks at power stations are well up to the desired spring levels. Totalling 4·3 m tons, they are 0·3 m above last year, and this increase more than compensates for the steam station generating capacity which has been added since last April. This reserve is officially estimated as equivalent to 5·4 weeks consumption at the average winter rate, so even allowing for the expected growth in demand for electricity, there should be little difficulty in building up to the six or seven week's stocks needed by October in preparation for next winter. A factor brightening this picture still further is the reserve of some 1·9 m tons of opencast coal, 1·6 m tons more than last year, held by the N.C.B., for this must be primarily suitable for power station use. The outlook up to October, then, is favourable. Afterwards, it depends on the success achieved by the coal industry in its drive to step-up production. At the moment its output is up on last year, but by too small a margin to be considered in any way satisfactory in view of the officially announced aim for increased exports and the ever rising home demand.

OUTLOOK FOR BUSINESS

UNDERLYING the perennial theme of balance of payments difficulties, there is a note of cautious optimism in the Government's Economic Survey for 1953. Demand at home is expected to continue and accentuate the improvement that was apparent at the end of last year, especially in the realm of consumer goods, and industry is expected to be in a position to meet this demand as well as satisfy its export orders. This is welcome news for electrical traders, for whom 1952 proved a difficult time. Combined effects of a general recession in trade and an intentionally anti-spending monetary policy produced a drop in consumer's expenditure during the year, which was mainly concentrated as an effective 8% drop in personal expenditure on household goods, the sector with which electrical retailers and their suppliers are most closely concerned. Necessarily, the forecast of a brighter outlook ahead is tentative: any major changes announced in the Budget will exercise a direct effect upon demand, and an easing of world tension as a result of a settlement in Korea would so alter the economic position as to make all forecasts wide of the mark. Moreover, in the long term, a new factor has grown into importance, as the Economic Survey is careful to emphasise. With the gradual return to normal trading conditions, the demand experienced by manufacturers is being determined to an increasing extent by the business judgement of individual traders, who have to adjust their stocks in accordance with their own reading of this uncertain future. But with all the hazards that he has to face, both the retailer and the manufacturer of consumer goods must find the best consolation they can in the Survey's forecast that the outlook for this year remains brighter than 1952.

LOW LIMIT

THE ceiling placed on annual capital investment has been a continuing source of complaint with respect to Government economic planning applied to the supply industry. This limit is usually expressed in terms of new generating plant, but in fact it extends to transmission and distribution equipment as well, and in his railing against it, Lord Citrine has had widespread support. But how does this investment rate compare with that permitted and achieved elsewhere?

Some measure in terms of other European economic systems is given in a recent U.N. Economic Commission for Europe study, which analyses capital investment in the supply industry during 1951 for some 18 countries. Great Britain, at an equivalent of 9 dollars per head of population stands well up the list, exceeding in terms of this parameter only by those countries which are largely concerned with more expensive hydro-power installations. Yet the American rate of investment, given in this same survey, was no less than 20 dollars per head. Though the comparison is valid for 1951 only, and although this was a year in which British commissioning was probably limited more by restricted output of boilers and constructional steel than by finance, the extent of the difference is startling. Britain was struggling to make good a proved shortage of available generating capacity and to provide power for increased productivity : the United States merely expanding to keep pace with the natural growth of demand from busy industry and a high living-standard public.

HIRE CAN HELP

ELECTRICITY has not done well in the post-war competition for the housewife's cooker custom. In spite of all that electric cooking can offer in terms of low-running cost and cleanliness, appearance and convenience, gas is gaining ground. More might be done to even up matters by skilful use of promotional publicity and there is scope here when greater activity becomes permissible, but this alone is not the whole answer. Initial cost is the principal obstacle to be overcome: the first cost of an electric cooker and its wiring will always be greater than that of the gas equivalent. This at once suggests that housewives who are unwilling to commit themselves to the long-continued burden of monthly hire-purchase instalments may be tempted by the easier weekly terms possible with a hire scheme. We have invited Mr. N. F. Marsh to develop this theme for us, because the East Midlands E.B., of which he is chief commercial officer, alone operates a full hire scheme; and we recommend to our readers his article on a later page. He presents a strong case; the need for some radical change in present policy towards cookers is patent if the cooker business is to be brought out of the doldrums and electricity boards to reap the benefit of a desirable load. Cookers are needed on domestic supply systems: if simple hire can forward their installation, then it should be made available, even though it may offer no financial advantage in itself. Area boards are much concerned to give better service to consumers; here is a way such service can be given, at less cost perhaps than the provision of additional service centres.

H.F. MEDICINE

HIGH frequency heating at wavelengths in the centimetric range has obvious advantages for medical purposes. Living tissues, because of their considerable water content, are high-loss dielectrics, and can thus be readily heated by such electro-magnetic radiation, and the increased flow of blood that accompanies such heating is often beneficial. Since the end of the war, research into this field has been active, particularly with reference to the harm that can accompany the undoubted good such radiation can bring. Most of the possible troubles and complications stem directly from variations in the dielectric constants of different components of the body, and from the effect of the irregular shapes of the bones. Such matters may be readily allowed for when control is in the hands of an expert, and only one alarming possibility seems to have emerged from all the investigational work, according to a recent American article on the subject: there is some danger of damage to the eyes if they are exposed to high-field strengths of radiation of the order 10 cm. In general, however, microwaves seems a largely unshadowed boon to the medical man, a worthy addition to an already extensive range of electrical aids and, incidentally, only a relatively slight additional hazard to the technician who has to work with them.

Meteor

ELECTRIC COOKERS —*the Case for Simple Hire*

Mr. N. F. Marsh, Chief Commercial Officer of the East Midlands Electricity Board, surveys for us the main reasons for offering hire facilities to consumers

IN spite of strenuous efforts on the part of the supply industry to increase the sales of electric cookers only modest headway is being made, taking the country as a whole. The electric cooker is vital to the development of domestic supplies of electricity and to the economy of domestic electricity tariffs : most people agree on this point, and one wonders, therefore, why the industry has been so ready to turn its back on the time-honoured and well tried instrument of simple hire.

A modern small (two-plate) cooker sells for about £25, and wiring and a control unit for about another £8, making a total of around £33 for a consumer to pay for the smallest electric cooker other than miniature cookers which are a little cheaper and do not require special wiring. This sum spread over seven years on hire purchase amounts to about 2s. 4d. per week, whereas there are a number of good gas cookers which sell at 1s. 8d. per week or less on hire purchase over the same period, and the piping charges, if any, are nominal.

Early Success

The electric cooker business could never have been built up in the face of well-established gas competition if it had not been for the widely adopted policy of simple hire. Many thousands of electric cookers were put out on hire between the two wars at rentals of 3d. to 5d. per week, which included all maintenance and partly as a result of this policy the domestic load factor was improved out of all recognition. Of course, the present cost of a cooker and wiring may be two and a half to three times what it was when these rentals were fixed, but simple hire business can be picked up successfully today at rentals of around 1s. to 1s. 2d. per week and will satisfy many consumers who cannot afford 2s. 4d. per week for hire purchase, and would otherwise do without electric cooking.

The opponents of simple hire usually put forward the following three objections to it: (i) that it is not attractive to consumers if transacted on an "economic" basis; (ii) that consumers do not look after hired cookers, and that maintenance charges are therefore high; (iii) that simple hire has to be financed out of the meagre allocation of capital expenditure allowed to the industry.

Dealing first with point (i) it is true that if rentals are based on a life of seven years (the accountancy period) and heavy maintenance and overhead charges are "piled on," the resulting weekly rental is of the same order as the hire purchase instalment—and it is equally true that in these circumstances no one would prefer the rental.

However, it is well known that there are many thousands of simple hire cookers still giving satisfactory service after 20 years or more, although one would like to see some of them exchanged for more up-to-date models. New cookers installed today will certainly still be on circuit in 15 to 20 years time and any hire scheme should be based on at least 15 years.

Maintenance Costs

On the question of maintenance, experience shows that 30s. per cooker per annum is an adequate figure, even allowing for a complete strip down once or twice in the life of a cooker—provided the major overhauls are organised on a proper basis.

A typical build-up of the annual charges on the simple hire of a small cooker might be as given in the table.

TABLE 1. ANNUAL CHARGES FOR HIRE OF A COOKER

	£	£ s. d.	
Cost of cooker, control unit and wiring, say	25		
Less contribution to cost of wiring (desirable in order to avoid casual return of hired cookers), say	3		
	22		
Annuity on £22 at 4¼% for 15 years		2 0 3	per annum
Maintenance (including overhead charges applicable thereto)		1 10 0	,, ,,
Office charges, say		4 0	,, ,,
		3 14 3	,, ,,
or a little over 1s. 5d. per week			

One shilling and fivepence per week would be rather too high a rental for this class of cooker, but there would be a ready demand at a slightly lower figure : the balance could properly be met out of the increased sale of electricity, bearing in mind not only the individual economy of the particular supply but also the overall improvement of the system load factor as the result of encouraging the cooking load, which would be reflected in the standard charges to domestic consumers.

With reference to point (ii) it is agreed that in general, apparatus which does not belong to the consumer is not so well looked after as that which does, but this can be taken care of in the level of maintenance charges allowed, and in practice 30s. per annum is quite adequate, even including the occasional complete stripping down of the cooker.

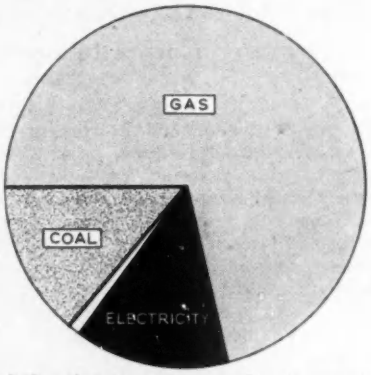


Fig. 2. Based on a recent survey, this diagram shows how cooking in the home is at present split between the three principal types of fuel. Now compare this with Fig. 3

Worth-while Load Building

So far as point (iii) is concerned, it is true that the industry is having difficulty in cutting down its rate of capital investment to the limited allocation given it, but surely the simple hire of essential load-building apparatus such as cookers and water heaters deserves some small part of this allocation. Looked at from the "business angle," the simple hire of cookers is a better proposition than a good deal of other capital work that has to be undertaken for the extension of supplies to new consumers. It is not suggested that in present circumstances the industry can afford an "all out" policy of simple hire or that this would be desirable, but surely it can well afford a moderate investment in simple hire equipment; the rate of attracting this business can be fairly closely controlled, partly by a policy

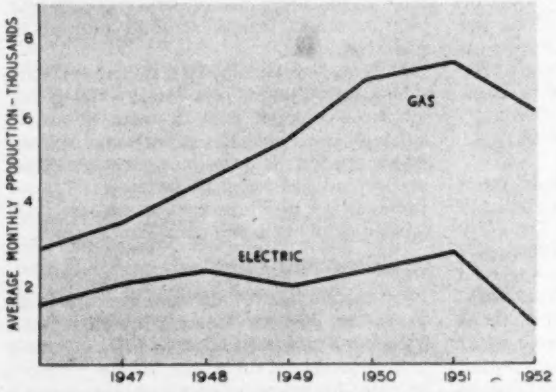


Fig. 1. Relative production of gas and electric cookers since the war is contrasted in this curve, which is based on the official Digest of Statistics. The steeper climb of gas cooker output is clearly apparent

of instructing service centre staff to effect a sale wherever possible, and partly by allocation of simple hire models on some kind of priority basis.

Longer H.P.

A good deal of business is being lost to gas today because simple hire is not more generally available and it is doubtful whether, in the long run, the industry can hold its own with the Gas Boards unless modern electric cookers can be made available at weekly charges comparable with theirs, and this can only be done effectively with simple hire.

Hire purchase over longer periods does not

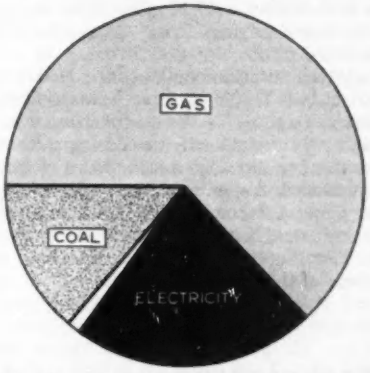


Fig. 3. This is how housewives would choose to cook given only "freedom from fuel restrictions." The desire for more electrical cooking is immediately apparent. Hire facilities should boost the preference still further

seem to be the real answer, since it involves spreading the purchase over practically the full life of the cooker—say fifteen years—and it is doubtful if many consumers would be prepared to enter into an agreement to commit themselves to weekly or quarterly instalments over so long a period. In any case, maintenance would presumably have to be carried out by the hirer during the period of the transaction and would be substantial and the working capital required in the earlier years would not be far short of that required for simple hire.

Sales Effort

It is true that in some areas the sale of electric cookers is substantial and good results are being achieved in the face of severe gas competition. The annual cost of the sales effort necessary to achieve this result must, however, be considerable, and in the long run may be more than the residual charges on a simple hire scheme which cannot be met out of the rentals.

There is another good reason for adopting a measure of simple hire today. The output of electric cookers from the manufacturers has fallen sharply over the last few years, due partly to the satisfying of the "sellers market" in this country following the war years when new cookers were not available, and due perhaps even more to the collapse of certain overseas markets as a result of currency restrictions and foreign competition. The result is that the manufacturers' output is far short of their economic capacity and they are hard put to it to hold the price of existing cookers steady, let alone develop new cookers. There are a number of very good electric cookers on the market, but even better ones are needed to compete with the best the gas industry can produce.

Price and Demand

It is, however, no use at all developing new electric cookers if the price is to be higher. Increased demand is the only answer, and if this is not forthcoming from greatly increased sales—and there is no evidence that it is—a moderate amount of simple hire would make all the difference to the task of the manufacturers.

It must be remembered that an electric cooker will always cost more than an equivalent-sized gas cooker due to the inherent nature of the two products, and that wiring and switches will always cost more than piping and taps. This is the main reason why there will always be difficulty in competing with gas cooking on a purely hire purchase basis without any hire arrangements.

Consumer Service

This article will be concluded where perhaps it should have begun—on a note of consumer service. There are many thousands of consumers in this country who are at present enjoying the use of cookers, water heaters, washboilers, etc. on simple hire at reasonable rentals, and who could ill afford to purchase such apparatus: these facilities have now come to be regarded as an integral part of the comprehensive service that electricity has to give, and much goodwill has been built up around them. It seems a pity to depart from this policy when the industry needs all the goodwill it can muster, and certainly needs an increasing outlet for domestic sales of electricity if tariffs are to be kept at a reasonable level in the face of rising costs.

E.L.F.A.'s Work in 1952

IN the annual report of the Electric Light Fittings Association it is noted that purchase tax continues to be one of the bugbears facing lighting fitting manufacturers. Although the industry has fared reasonably well in the face of trade recession elsewhere, the position of commercial and domestic fitting manufacturers gave no cause for satisfaction due, it would appear, to sales resistance occasioned by purchase tax. In this direction, however, the Association requested, in view of the Ridley Committee's recommendation that the tax should be removed entirely from fluorescent lamps, that the Chancellor of the Exchequer should remove the tax from taxable fluorescent fittings.

Allocations of steel, blackplate and tinplate to its members have continued to be made by the Association. The general inadequacy of steel, unfortunately, necessitated the use of less economic substitutes, which in turn hampered the industry in maintaining reasonable production costs and prices. Sales of industrial fittings, however, were maintained at a high level. Meanwhile E.L.F.A. continues to press the B.o.T. for a more generous allocation of steel.

It is unfortunate that, in the export field, import restrictions imposed by Australia, and in other traditional markets, brought about a reduction in exports by members to these territories. Moreover, it is continuously being brought to the notice of Government departments concerned that the provision of modern lighting equipment to exporting concerns ranks of equal importance to the export of such equipment itself. Increasing foreign competition should give this argument added weight. Overseas sales of equipment improved last year from £4·3 million to £5·32 million, due largely to increased buying from Commonwealth countries.

The Association has continued to support the Electrical Fair Trading Policy, deprecating any tendency to regard classification of customers as wrong. Its technical activities during the year were extensive, a considerable amount of work being handled in standardisation and development. Close collaboration with other organisations has also been maintained on excellent terms. At the end of the year there were 45 members of the Association.

In Defence of Associations

AN able case for the benefits to the public of trade associations was put forward at the annual luncheon of the Electric Light Fittings Association last week. The theme was set by Sir Vincent de Ferranti in proposing the toast of "The Association." He straightforwardly avowed his faith and belief in rings, and further emphasised it by his appreciation of the work of the Association in its aim towards better lighting.

It was the President, Mr. K. Scott Adie, who, in replying, took up the defence of associations against present-day phobias. The anti-association complex in some minds could develop into something in the nature of a witch hunt. In the suspicion that is being directed towards the sensible co-ordination of industry it is difficult to comprehend exactly what is being attacked. He affirmed that the consumer—the eventual purchaser of equipment—has benefited considerably and has been safeguarded by the work and ideals of electrical trade associations. Responsible Government officials welcome the existence of an organised body representing its particular section of industry; it provides a ready-made conference table for discussion of matters of national importance and facilitates quick action in times of need.

This function was shown during the war when, in order to increase production, a legal maximum of lighting intensity in factories was desired. A joint committee was set up on which were represented the associations concerned in this major task. Had the industry at that time comprised only unorganised individual firms, the vital target of lighting for production could not have been achieved. Other examples exist of the value of E.L.F.A.'s activities and Mr. Adie was convinced that any curtailment of the electrical trade associations would retard progress and be detrimental to the community.

Mr. A. E. Iliffe was in fine fettle when proposing "Our Guests," that difficult toast to which he brought humour and life. Mr. H. S. Pocock responded for the guests. A final toast to "The Past Presidents" was given by Mr. C. J. W. Scott, in which particular tribute was paid to Mr. Scott Adie who would be vacating the chair that afternoon. The reply was made by Mr. A. J. Burbidge.

THE PRINCIPLES OF POLYPHASE A.C. COMMUTATOR MOTORS

A Simple Analysis, together with the Practical Applications and Characteristics of these Machines is given in this Article

By J. L. WATTS, A.M.I.E.E.

UNDER all stable conditions, the torque developed by a motor is equal to the resistance torque of the load to which the motor is coupled, and the motor automatically adjusts its speed to meet this condition. This torque, in the case of an induction motor, is proportional to the product of strength of stator magnetic flux, rotor current, and the power factor of the rotor circuit. If, as at starting or due to a reduction of the load, the motor torque exceeds the resistance torque of the load, the excess motor torque will cause the motor to accelerate its load until the stator and rotor currents and the motor torque have fallen, so that the motor torque again equals the load resistance torque. Increase of load will cause increase of stator and rotor currents as the motor slows down until the motor torque has risen to the same value as the load resistance. Of course, if the load is excessive the over-current trips may operate, the motor may stall or its windings burn out.

Speed Control

On a given supply voltage and frequency, and with a given rotor circuit resistance, therefore, an induction motor runs at a definite speed on each value of load. The speed of a slip-ring motor can, however, be reduced on any load by connecting external resistance in the rotor circuit to control the rotor current. This causes the motor speed to vary considerably on a varying load, a characteristic which is unsuitable for many industrial drives. The method also is uneconomical because the power input to the motor on a given load torque is almost constant, although the horse power output is proportional to the product of speed and torque. The reduced speed is obtained only at the expense of considerable waste of power in heat at the control resistance, which must be large enough to dissipate the heat without reaching a dangerously high temperature.

The speed control resistance in the rotor circuit functions by absorbing some of the voltage which is induced in the rotor windings as they are cut by the rotating magnetic field produced by the current in the stator windings. The motor speed can, however, be controlled by other methods of absorbing or controlling the voltage acting on the rotor windings. For example, voltage can be injected into the rotor circuit from some source internal or external to the motor. This injected voltage can be arranged so that it either assists or opposes the induced rotor voltage, but it must have the same frequency, the same number of phases, and the same phase sequence as the induced rotor voltage.

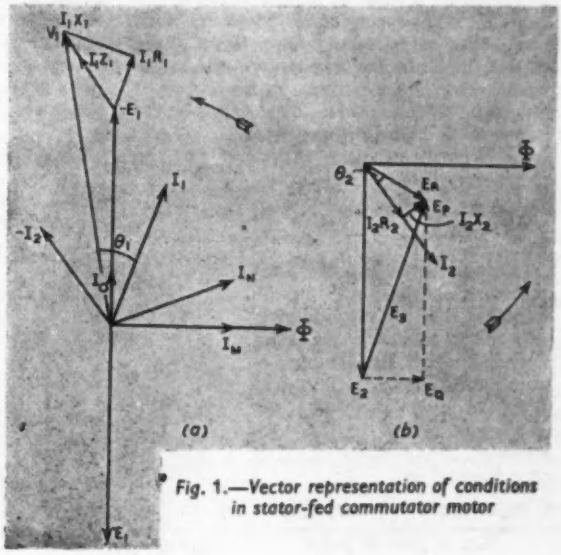


Fig. 1.—Vector representation of conditions in stator-fed commutator motor

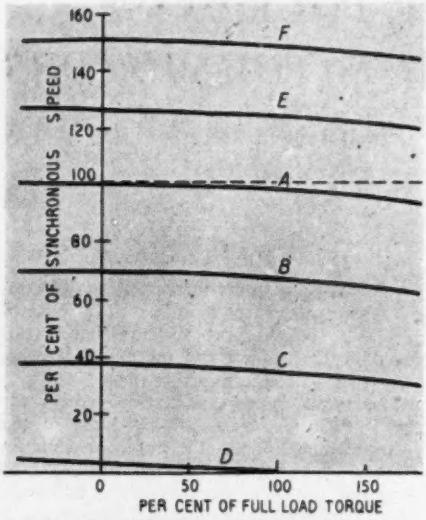


Fig. 2.—Speed-torque characteristics of induction motor with injected rotor voltages

Effects of Injected Voltage

If the injected voltage opposes the induced voltage, the rotor current and motor torque at a given speed will be reduced, thus causing the motor to slow down to a lower speed. On the other hand if the injected voltage assists the induced voltage the motor torque will be increased and the motor will accelerate to a higher speed. If required the motor can be run at more than synchronous speed by such means. Further, since the power factor of the primary input to the motor depends on the power factor of the secondary rotor circuit, it is possible to control the power factor of the induction motor by injecting into the rotor circuit voltage of the required voltage and phase relationship to the induced rotor voltage to raise the power factor of the rotor circuit.

The actions between the rotor and stator take place only through the medium of the rotating magnetic flux produced by the stator currents, which flux rotates at synchronous speed with respect to the stator windings, and at slip speed with respect to the rotor windings. Synchronous speed in r.p.s. is equal to

$$\frac{\text{Supply frequency (c/s)}}{\text{No. of pairs of poles}} = N_s$$

Slip speed in r.p.s. is equal to $N_s - N$, where N is the speed of the rotor in r.p.s. and the fractional slip is equal to $\frac{N_s - N.}{N_s}$. The rotor circuit voltages and currents are at slip frequency, which is equal to $f_s = \frac{f(N_s - N)}{N_s}$, where f is the supply frequency. It will be appreciated that since the electromagnetic actions in the rotor are at slip frequency with respect to the rotating flux (which moves at slip frequency with respect to the rotor), these actions will synchronise with the rotating flux in the air gap and through this medium will react on the stator and its currents. The e.m.f. induced by the rotating flux in each phase of the stator winding will be equal to $E_1 = K_1 f T_1 \Phi_m \times 10^{-8}$ volts, where K_1 is a factor depending on the design of the stator windings, f is the supply frequency, T_1 the number of turns in each phase of the stator windings, and Φ_m is the maximum or peak value of the magnetic flux. The e.m.f. E_2 induced in each phase of the rotor windings by the same (mutual) flux Φ at slip frequency $(f_s) = K_2 f_s T_2 \Phi_m \times 10^{-8}$ volts.

Vector Representation

The vector diagram in Fig. 1b refers to the conditions in one phase of the rotor windings when subject to an injected voltage, E_3. The vectors revolve at slip frequency with respect to the rotor and its windings. The induced voltage E_2 created by the rotating flux Φ is proportional to the rate of change of the flux with respect to the windings and lags by a quarter of a cycle behind the flux. The resultant voltage acting on the rotor windings will be E_R and this will cause the current I_2 to flow in the rotor windings.

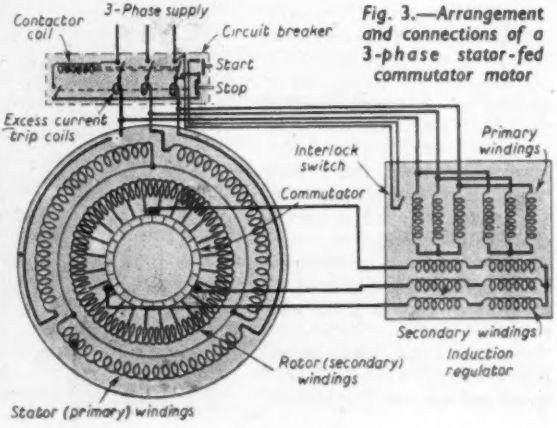


Fig. 3.—Arrangement and connections of a 3-phase stator-fed commutator motor

The current I_2 is equal to $\frac{E_R}{Z_2}$, where Z_2 is the impedance of the rotor circuit, and is equal to $\sqrt{R_2^2+X_2^2}$, where R_2 is the resistance of the rotor windings and X_2 the reactance of the rotor windings. The reactance X_2 results from the rotor current I_2 producing a certain amount of leakage magnetic flux which is linked only with the rotor windings and core. X_2 is equal to $2\pi f_s L_2$ ohms in the case of leakage flux of sinusoidal wave form; where L_2 is the self inductance of the rotor windings per phase and is numerically equal to the product of the rotor turns (T_2) per phase, the leakage flux per amp, and 10^{-8}, and is measured in henries. The resistance R_2 of the rotor windings causes the volt drop $I_2 R_2$ in phase with the rotor current I_2, whilst the reactance X_2 causes the volt drop $I_2 X_2$ which leads the rotor current I_2 by a quarter of a cycle. Thus the power factor of the rotor windings ($\cos \theta_2$) will be equal to $\frac{R_2}{Z_2}$;

$$\theta_2 = \tan^{-1} \frac{X_2}{R_2}$$

Fig. 1(a) refers to the conditions in one phase of the stator windings, the vectors revolving at mains frequency. The e.m.f. E_1 induced in the stator windings by the mutual flux Φ will lag behind the flux by a quarter of a cycle and thus must be overcome by an opposite component $-E_1$ applied to the windings. The vector I_M represents the magnetising current, whilst I_o represents the component of stator current required to provide the iron losses due to eddy currents and hysteresis in the machine; thus I_N represents the no-load stator current.

Effect of Rotor Current

The rotor current I_2 has a demagnetising effect on the stator flux Φ, as well as creating a certain amount of leakage flux round the rotor conductors, which effect must be overcome by the component $-I_2$ of stator current. Thus the stator current will be represented by the vector I_1 which is the combination of the no-load current I_N and the component $-I_2$. There will be a resistive volt drop $I_1 R_1$ in the stator windings in phase with I_1, together with a reactive volt drop $I_1 X_1$ which leads the current by a quarter of a cycle. X_1 is due to leakage flux produced by the stator current which is linked only with the stator and does not contribute to the mutual flux Φ. In the case of sinusoidal leakage flux, X_1 will be equal to $2 \pi f L_1$, where L_1 is the self inductance per phase of the stator windings due to the leakage flux. The relative scales of Figs. 1(a) and 1(b) will depend on the ratio of primary to secondary turns. From these diagrams it may be noted that the phase relationship between the induced rotor voltage E_2 and the injected rotor voltage E_3 will govern the power factor of the rotor circuit and of the primary input to the stator windings, whilst the value of the injected voltage will govern the value of the rotor and stator currents and the motor torque.

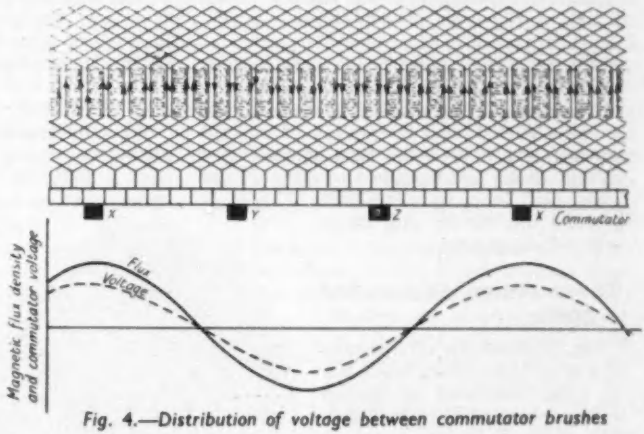


Fig. 4.—Distribution of voltage between commutator brushes

Power Flow and Speed

If the motor is being run at more than synchronous speed by injection of rotor voltage to assist the induced rotor voltage, electrical power must be supplied to the motor by the regulating apparatus used to govern the injected voltage. On the other hand if the motor is being run appreciably below its synchronous speed by injection of voltage to oppose the induced voltage electrical power must be taken from the motor by the regulating apparatus. The speed-torque characteristics obtained by this method of control will largely depend on the extent, if any, to which the injected voltage depends on the rotor current and speed. If the injected voltage is unaffected by the rotor current the speed-torque characteristic curve of the motor will be similar to that of an induction

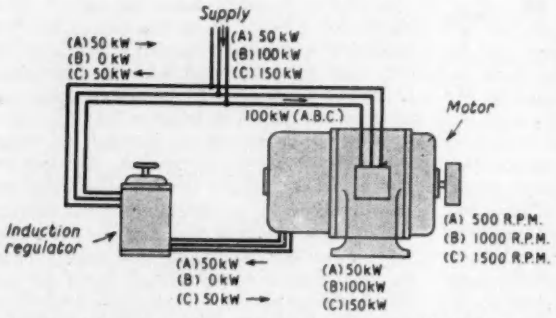


Fig. 5.—Approximate power flow conditions in a 1,000 r.p.m. (synchronous speed) commutator motor at various speeds on full load torque

motor, but will be raised or lowered as shown in Fig. 2, to a degree which depends on the value of the injected voltage. This diagram shows the results obtained with five values of injected voltage. It will be noted that injected rotor voltage which is independent of rotor current gives speed characteristics similar to those of a shunt d.c. motor with shunt field current control.

Three-Phase Stator-Fed Motor

Fig. 3 shows the arrangement of a three-phase motor which has its speed controlled by injected voltage obtained from an induction regulator, which acts as a transformer of variable ratio. The primary windings of the regulator are fitted in slots in its rotor core, whilst the secondary windings are in the stator, variable voltage output being obtained by turning the rotor so as to vary the angle between the magnetic axes of the stator and rotor. The regulator is double-wound, the magnetic fields are produced by split primary windings so that no torque is produced on the rotor, and the secondary voltages can be produced without variation of phase. The rotor may be turned by means of a handwheel or other mechanical means, or by a small pilot motor controlled by push buttons or other electrical switches.

The regulator may be used in a position such that the split secondary windings have opposing voltages induced in them to give zero secondary terminal voltage. In this position the rotor windings of the motor are then short circuited through the secondary windings of the regulator. As is shown by curve "A" in Fig. 2, the motor will function somewhat as a normal induction motor, the full load speed being slightly lower than that of a normal induction motor with short circuited rotor due to the volt drop created by the leakage reactance of the secondary windings of the regulator. Increase of motor load will cause the motor speed to fall slightly, the increased slip then causing increased rate of cutting of the rotor conductors by the rotating stator flux, with increase of slip frequency, rotor and stator currents and motor torque, until the motor torque has equalled the load resistance torque again. Reduced load has opposite effects.

Synchronous and Higher Speeds

When the regulator is set so that its secondary voltage opposes the induced voltage in the rotor windings the resultant rotor voltage and current will be reduced, this will reduce the motor torque and cause the speed to fall. As the speed falls the increased slip will increase the induced rotor voltage and the rotor current causing the motor torque to rise and stabilise, the speed at a lower value. The curves B, C, D in Fig. 2 refer to three values of opposing or negative injected voltage. When the regulator is set so that its secondary voltage assists the induced voltage the resultant rotor voltage will be increased, with increase of rotor current and torque, so that the rotor speed will increase (see curves E and F in Fig. 2). If the injected rotor voltage is made just sufficient to provide for the power output and the losses the motor can be run at synchronous speed on any load within its range. At synchronous speed the rotating stator flux and the rotor windings will

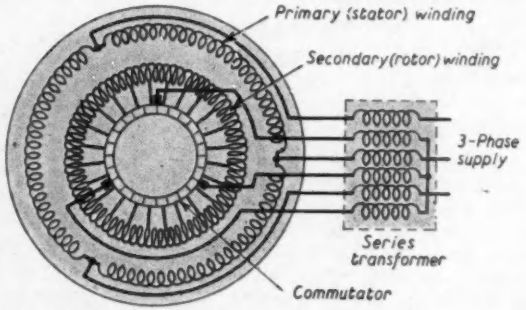


Fig. 6.—Connections of a three-phase commutator motor with series characteristic

be turning at the same speed, thus the slip will be zero and there will be no induced voltage in the rotor because the stator flux will not be cutting the rotor conductors. The rotor current will thus be created by the injected voltage alone.

If the regulator is set to inject a voltage greater than is required for synchronous speed the rotor current and torque will be sufficient to cause the motor to accelerate to more than synchronous speed. Above synchronous speed the slip will be negative, thus reversing the induced rotor voltages as the speed of the rotor exceeds the synchronous speed of the rotating stator flux, and the stator flux cuts the conductors in the opposite direction. Thus the induced rotor voltage will then oppose the injected voltage and the rotor current and torque will fall as the speed rises above synchronous value, and the speed will become steady when the motor torque has fallen to the same value as the load resistance torque.

Action of the Commutator

As stated previously the voltage injected into the rotor windings must have the same frequency as the induced voltage and this can be obtained at all speeds by using the commutator as a frequency changer to convert the supply frequency of the output from the induction regulator to slip frequency in the rotor windings. The stator windings of the variable-speed stator-fed commutator motor are generally similar to those of a normal induction motor, although in some cases additional interpole or damping windings may be provided to assist commutation. The rotor windings are similar to the armature windings of a d.c. motor or dynamo and are connected to a commutator. A.c. voltages of slip frequency are induced in the rotor windings by the rotating stator flux. In a d.c. machine the commutator converts the a.c. voltages in the armature coils to unidirectional (d.c.) voltages at the brushes. In a d.c. machine the armature coils revolve at N r.p.s. and the flux is stationary so that the frequency of the voltages in the armature coils will be equal to NP cycles per sec. where P is the number of pairs of field poles. In the stator-fed a.c. commutator motor the rotor coils revolve at N r.p.s. in a flux which rotates at synchronous speed (N_s r.p.s.). The frequency of the induced rotor voltages will be slip frequency $f_s = \frac{f(N_s - N)}{N_s}$, which the commutator will convert to supply frequency f at the brushes. When running at synchronous speed N_s r.p.s. the supply frequency current to the brushes will be converted to d.c. in the rotor coils, which is the reverse of what happens in the case of a d.c. machine which has a stationary flux.

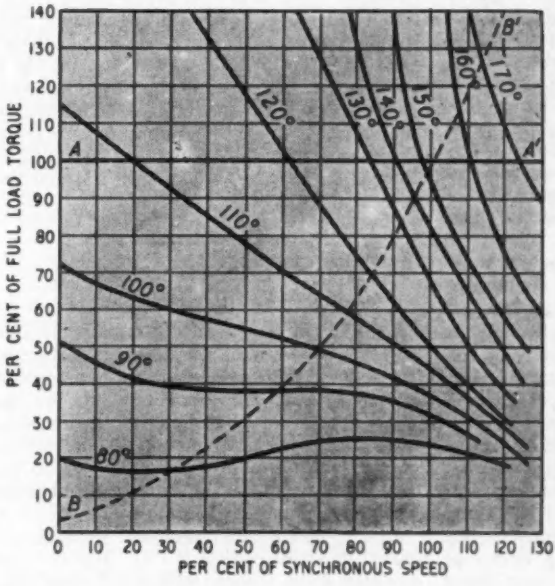


Fig. 7.—Speed-torque characteristics of a series a.c. commutator motor controlled by brush movement

At speeds other than synchronous speed the rotating magnetic flux of the stator will induce voltages in the rotor windings, which will appear at the commutator brushes. With sinusoidal flux distribution the flux and commutator voltages at a particular instant will be represented as in Fig. 4, the induced voltage at any instant in any coil being proportional to the flux which is passing the coil. With the brushes spaced one third of a double-pole pitch apart, as indicated, the peak voltages at the brushes will have one third of a cycle phase displacement. Thus three-phase voltages at mains frequency will be present at the brushes and will be synchronised with the three phases of the injected voltages from the regulator.

Stator-Fed Motor Characteristics

The connections shown in Fig. 3 give the motor a shunt speed-torque characteristic as shown in Fig. 2. Fig. 5 shows the approximate power flow in the motor circuit at various speeds. Below synchronous speed some of the power taken by the motor from the supply mains is returned to the mains through the induction regulator. At synchronous speed the power flow between the regulator and mains is zero, whilst above synchronous speed power is supplied from the mains to the motor through the regulator as well as taken direct. The total power input when driving a load of constant resistance torque is practically proportional to the speed, unlike the slip-ring motor which has almost a constant power input on the reduced speed obtainable by external rotor circuit resistance. Thus the commutator motor is very economical.

Overloads

The safe full load torque depends on the permissible rotor currents, which are limited by the size of the conductors, so that the full load torque of the motor is almost constant at all speeds. Horsepower is proportional to the product of torque and speed, thus the full load horse-power of the motor is practically proportional to the speed. It follows that on low speed the rotor windings may be fully loaded whilst the stator windings are carrying less than full load current. Thus line-connected over-current trips do not afford full protection against overload at low speeds. Such protection can, however, be afforded by means of over-current trips in the rotor circuit which control contacts in circuit with the no-volt coil of the stator switch. Line connected over-current trips are, however, required for short circuit and earth fault protection.

Fig. 1(b) shows that the injected rotor voltage E_3 can be resolved into a component E_P in phase or phase-opposition to the induced rotor voltage E_2, and a component E_Q in quadrature with the induced voltage E_2. The component E_P controls the rotor current and motor torque, whilst the component E_Q controls the power factor of the motor. The component E_Q can in turn, be controlled by regulating the position of the whole of the brushes round the commutator. Brush position also governs the starting torque of the motor.

With the regulator set for minimum speed the motor may develop a starting torque of about 150% of full load torque with about 175% of full load current. An interlock switch may be fitted on the induction regulator to prevent the motor being started with the regulator in any other position.

Stator-fed commutator motors can be obtained with ratings of about 1 to 500 h.p. with a normal speed range of three to one, or more. The stator windings of this type of motor can be wound for any convenient voltage so that these motors can be used on high-voltage mains if required. Since the number of brushes on the stator-fed motor is limited such motors are suitable even for dusty atmospheres, and can be made with totally-enclosed or enclosed-fan-cooled casings.

Polyphase commutator motors are also obtainable with series characteristics, the speed falling considerably with increase of load resistance torque. This characteristic may be obtained by using a stator-fed motor with brushes fed from a series transformer as shown in Fig. 6. The injected voltage will then depend on the primary current and load. Speed control may be effected by movement of the brushes round the commutator. Fig. 7 indicates the speed-torque characteristics obtained with various brush positions. The line AA^1 indicates the characteristics of a constant load torque, such as a reciprocating pump. It may be noted that the motor would drive such a load, of resistance equal to the full load motor torque, at the following speeds: 19% of synchronous speed with 110° brush setting, 61% with 120° setting, 84% with 130° setting, and so on. The curve BB^1 represents the characteristics of a centrifugal pump or fan, having a resistance torque which is almost proportional to the square of the speed. It will be noted that the variation of speed resulting from a given brush movement will be less on such a load than in the case of a load requiring a constant torque at all speeds.

TRANS-FRONTIER POWER EXCHANGES

AGREEMENT has now been reached within the Organisation for European Economic Co-operation between eight countries whose power systems are interconnected, for the short-notice transfer of power across frontiers if required for technical or hydraulic requirements. Such transfer may arise due to the necessity for conserving water or to maintain system stability. The decision takes effect on April 8, and entails automatic payment for power imported through E.P.U. The countries concerned are Austria, Belgium, France, Germany, Italy, Luxembourg, the Netherlands and Switzerland.

PROBLEMS AND PRACTICE in Engineering

Fault-Tracing by Electronics

THE application of audio methods to fault and interference conditions in supply networks is well known, but its practical application generally suffers from many outside considerations.

When using search coils directly coupled to telephone headsets in public highways, traffic noise invariably swamps the detected signal, especially under high earth resistance fault conditions where very little current can be passed to earth or between cable ends. Similarly, in audio bridge methods, the null or maximum volume point is extended due to the inability of the ear to detect minute changes against a heavy background of noise. Even in cable pits much of this may apply when induction methods are being used to identify cables.

There are also specialised cases of location involving the reception of radio-frequency signals in consumers' premises. For example, complaints, generally unfounded, of interference with radio reception from nearby power equipment. Finally, the method of "carbon microphony" fault location on single-core cables of varying and unknown cross section is very useful when all other means fail.

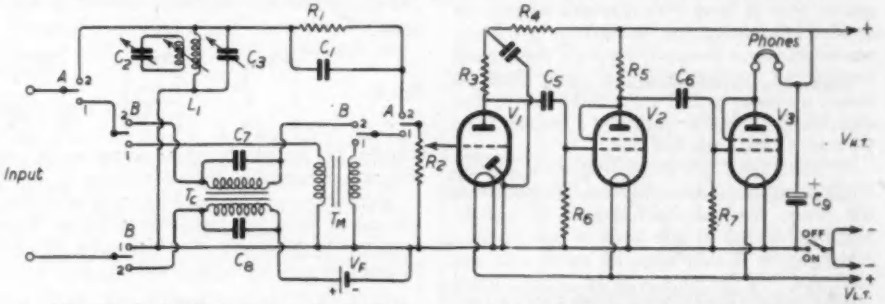
A small and portable electronic amplifier of robust design and simplicity of application will meet most of the above requirements. The diagram shows the amplifier built by the author, having three stages of audio-frequency amplification. The input impedance and input circuits are varied by two wafer switches, a potentiometer and variable R.F. condenser, giving four easily understood controls. With a gross weight, including batteries, of 7¼ lb, the equipment measures 9 in. by 6 in. by 4¾ in.

Its wide range of input frequencies will suggest many applications to power engineers, but the author's experiments may be of some assistance. Reference to these are by the following paragraphs, in which are given general notes on the amplifier's operation for the purposes indicated.

Audio and power frequency amplification (switch positions: A and B at 1). A superimposed signal is not essential when tracing a cable with a search coil and at reasonable depths can be detected and followed by 50 c/s hum only. This is useful when earth fault locations are being carried out. Also it has been found that the noise caused by arcing at the fault position is picked up very plainly. Striking the ground over the suspected location generally increases the noise and will check the first test. The reception of 50 c/s hum has also been used successfully for pre-spiking identification in cable pits, but most engineers have very definite ideas on this subject and the matter is best left to individual experiment.

Microphony fault location (switch positions: A at 1, B at 2). Often a cable will burn clear, leaving the cores practically free of earth and capable of passing only minute current through

Circuit diagram for the 3-stage amplifier. Component values, etc., are shown below



R_6-2MΩ; R_1, R_7-1MΩ; R_3-0·6MΩ; R_4,R_5-0·1MΩ
R_2-1MΩ Potentiometer
C_1, C_2-100μμFd; C_5,C_6-0·01μFd; C_4,C_7,C_8-0·05μFd
C_9-8μFd electrolytic; C_2-500μμFd variable

T_M-Input matching transformer to search coil
T_C-L.F. 'hum-bucking' choke
L_1-'Weyrad' HA3
V_{HT}-4·5v; V_{LT}-1·5v; V_4-9v 'grid bias all dry battery sources

the carbon track. Normal open-circuit tests may be impossible, due to unknown alterations to cross section. However, if a small current can be passed through the fault carbon it will vary according to the fault resistance, and this resistance can be varied by disturbing the carbon. In practice, the amplifier is connected across the fault and a man is sent along the route striking the pavement. The current variation when he is over the fault produces a voltage variation across R_2 which is amplified. Crude as this method may sound, 60% of recent faults considered hopeless and relegated to the "cut and hope" class have been successfully and accurately located.

Radio-frequency reception (switch position: A at 2, B at 1). In London with a short aerial the receiver tunes to Light and Home Service programmes and will react similarly to any mains-operated radio set, except that it will not be prone to induced and extraneous interference from the supply. Its use as a monitor and radio-frequency interference locator is therefore obvious.—*J. A. Dell.*

Switchboard Ammeter Fault

IN our rolling mill plant there was concern regarding the current readings indicated on the switchboard ammeter. It was the motorman's opinion that, according to the section of the material being rolled, the current indicated should have been much less. There was no heavy thrust at the motor driving the rolls, which would be a likely cause of an overload.

As the load varied in accordance with the various passes of the rolls, it was observed that the ammeter needle appeared slow to indicate the no-load current and at full-load appeared to accelerate quickly. As a check-up it was suggested that a tong test ammeter should be applied. On comparing the readings of the two ammeters it was observed that: (1) The current readings of the tong ammeter varied from 90 amps, no load, to 300 amps full-load (2) The switchboard ammeter indicated a reading from 90 amps to 400 amps full load.

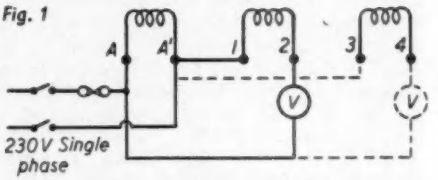
At this stage it was assumed that the switchboard instrument was at fault. On removing the cover, the fault itself showed by a slight angular fracture at the base of the pointer, leaving only a thin edge of metal. It was observed that the pointer tilted when moved gently beyond a perpendicular position, registering the 400 amp mark, thus explaining the abnormal reading.

It was a general practice for the motorman to log the ammeter readings at half-hourly intervals. For this reason the tong test ammeter was replaced in a more observable position. At the close of the shift the faulty instrument was removed and dispatched to the laboratory for repair.—*Novis.*

Checking Motor Connections

RECENTLY a 4-h.p., 3 phase, a.c., 400 V, 1,450 r.p.m. star/delta motor was brought in with a request to have the ends of the stator windings correctly marked. For some unknown reason the six ends were not marked in any way. The only supply available was 230 V single-phase a.c., used to establish the correct connections as follows.

Fig. 1



The ends of each phase winding were tested out by means of a test lamp and marked as shown in figure 1. The 230 V single-phase supply and a voltmeter having a range of not less than twice the testing voltage were connected as shown by the solid lines. The rotor was run up to speed by mechanical means and the single phase supply switched on. The voltmeter reading was about 390 V (approximately $\sqrt{3}$ times the testing voltage), therefore terminal marked 1 was tagged B^1 and terminal marked 2 tagged B.

The connections were next arranged as shown by the dotted lines in same diagram. Similar tests were again taken as previously described. The voltmeter reading was about 230 V, therefore terminal marked 3 was tagged C and terminal marked 4 tagged C^1.

Fig. 2

Finally the terminals were permanently arranged and tagged as shown in figure 2.

On being connected to the star/delta starter, the motor terminals were connected to their appropriate terminals of which A^1, B^1, C^1 formed the star connection.—*E. A. Robbins.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Magnetising Inrush Currents

in Transformers

Part II

By K. W. E. GRAVETT, M.Sc. (Eng.)

In part I of this article, published in The Electrical Times of 2nd April, 1953, Mr. Gravett developed the theory of transformer inrush currents. In this concluding part, he reports experimental results and discusses some characteristics that are important in practice

IN order to demonstrate the advantage of switching on an outer winding, where the air-core reactance is greater, a further Crystalloy specimen was prepared. This had two windings, each of 800 turns and similar resistance, but the outer having a cross-sectional area four times that of the inner. Fig. 5 compares two oscillograms obtained by switching at the same flux density on each winding. Since the circuit resistance is high, the difference is small, but it would be more noticeable in a full-size transformer.

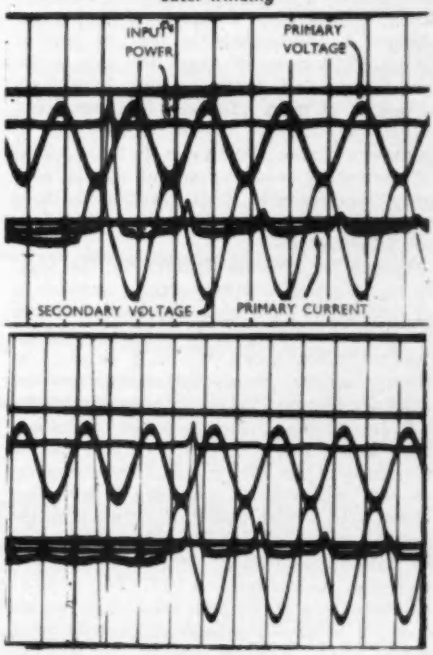
Oscillograms were also taken to demonstrate that the peak current decreased with increase of circuit resistance and increase of load current, although, in spite of the high impedance, the decrease in the latter case was small. Also of interest, to ascertain whether the current rush was transmitted through other transformers feeding that being switched, one oscillogram was taken of a model transformer switched at the 0° instant, the supply being obtained from the 1 : 1 ratio specimen described above. The primary current for each transformer and the secondary voltage of the supply transformer were recorded. This oscillogram (Fig. 7) shows that the transient is transmitted through the feeding transformer and also that an instantaneous voltage dip occurs.

Gaps in Cores

The effect of gaps in the core will now be considered. For this a set of U and I stampings in Mumetal were obtained to a similar cross-section and magnetic length to the clock-spring cores. These were first assembled in interleaved form, an 800-turn primary being wound with a 100-turn secondary on two bobbins. They were then reassembled in butt-jointed form, the same windings being used, their resistance adjusted in each case to correspond with that for a previous test on a toroidal specimen. It was noticed that the butt-jointed core had only 0·5% remanence and the interleaved core 33% in a hysteresis loop from 6 kilogauss.

Although the values obtained from the oscillograms are of little practical value themselves, they demonstrate the true reason for the apparent reduction of current surge due to gaps in the core. It was found that the peak current reached for a fully demagnetised core was almost independent of the method of jointing. The remanent flux left on switching

Fig. 5. The upper oscillogram shows switching on an inner winding, and that below, switching on an outer winding



off at a current zero was, however, very different and this affected the highest attainable peak current considerably. The steady-state current also increased rapidly as the effective gap was increased, and thus the ratio of peak to steady normal currents was greatly reduced.

Reducing Inrush Currents

It must be stated immediately that the author does not advocate universal precautions against this phenomenon, but only where previous experience has shown that their nuisance effects cannot be tolerated. A brief résumé will be given of the useful suggestions which have come to his notice.

An early suggestion of great value is that inrush currents may be reduced by switching the magnetising circuit initially with a resistance in series and removing this after a few cycles. This may be conveniently done by providing extra contacts on the main switch. This method is very useful, the resistance preventing high currents being reached until the magnetisation of the iron has fallen almost to normal. The value of resistance is not critical, American authors suggesting one giving 75-85% drop, although even 5% is most effective. This resistor will not have to carry load current, but must not be accidentally damaged by a through short-circuit should it occur, and therefore it must be of high power rating. A disadvantage is that the resistor voltage drop is out of phase with that of the transformer and hence reactors have been suggested as more effective. Economic considerations, however, favour resistors, and in general resistance switching is the best method of overcoming switching current troubles with power transformers. Radio transformers have higher impedances, but resistance switching is still highly effective.

Usually in a power transformer the high-voltage winding is on the outside, and due to insulation and oil ducts is appreciably further from the core than the low-voltage winding. This additional space may in a large transformer increase the air-core reactance of the outer winding over that of the inner winding by a factor of 50%. Thus, in a unit of this size the maximum possible inrush current may be reduced in the ratio of 1·5 : 1 by energising on the high-voltage winding. The higher impedance of the transformers used in the power supply circuits of radio equipment reduces the advantage so gained to almost negligible proportions.

Elimination of residual magnetism in the core would greatly reduce the probability of inrush current troubles, especially as breakers

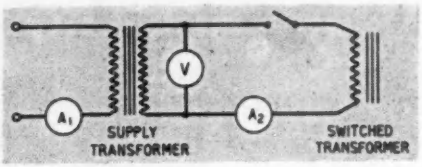


Fig. 6. Circuit for checking effect of inrush current on a transformer which feeds another, the latter being switched on the supply

usually leave a high residual flux. Also, since the surge is so sensitive to this, the maximum possible current is much reduced. It has been suggested that, if a capacitor be connected across the secondary terminals of the transformer, when it is switched off, oscillations will be set up in the secondary circuit, tending to demagnetise the transformer core. Further experiments have shown that the rating of the capacitor required corresponds to 40-50% of the transformer kVA. Such a capacitor could be of practical value in reducing residual flux, but in a power system unless required for power-factor correction would be an uneconomic item. However, in radio and electronic equipment, condensers of appropriate size are readily available. Fitting them would probably be cheaper than resistance switching, requiring a non-standard switch. Thus, for this size of equipment they are of value in reducing, if not eliminating, residual flux and keeping the inrush current within safe limits.

A similar idea is the suggestion that when a transformer is used with a rotary convertor, the system should be switched off from the primary side, allowing the machine to run down with full excitation maintained. It has recently been shown that demagnetisation is not always effective under such circumstances, but where such equipment is in use this procedure is to be recommended.

Effect on Protective Gear

Protection against faults in the transformer itself may be carried out by one of several differential protective devices, in which the power input is compared to the power output. In addition to this, in Britain, large oil-filled units are fitted with Buchholtz relays. This equipment is actuated by gases evolved in the transformer tank and is useful in detecting insipient insulation faults. It will be obvious that any differential system comparing input and output currents will be affected by magnetic inrush currents, which for a short time after switching represent considerable power input

to the core, even though the relay setting is never so exact as to operate on steady-state magnetising current. Indeed, this is often how high inrush currents are first detected. Buchholtz relays will, of course, remain unaffected.

Methods of overcoming such spurious operation of relays upon switching may be considered under two headings: first, modification of existing relays; and, second, the development of some kind of instrument dependent for its non-operation upon the waveform of the current surge.

It has long been suggested that either the time-lag of the relay should be adjusted so that it should not be in a position to operate until the transient was over, or that the sensitivity be altered so that inrush currents do not cause actuation. While this method is open to the criticism that the relay may, especially in the latter case, be prevented from acting on a genuine fault and thus not fulfilling its proper duty, it requires no additional apparatus and may be readily adjusted on site should trouble occur. A typical suggested setting is half rated (differential) current and ⅛ sec. time-lag. A second relay set at 10% rated current and 1-2 sec. delay would give additional protection for small persistent internal faults.

Special Relays

As has been shown previously, magnetising inrush currents have a high harmonic content and also a decaying direct component. Transformer fault currents have a higher percentage of fundamental. This information is utilised in the design of several special relays for transformer protection. Many and various are these designs. They have not achieved much importance, largely on account of cost, and their use is only suggested in cases where severe troubles have been experienced. The author can offer no opinion as to their relative merits.

Certain types, however, deserve mention. The first, a Continental design, has its mechanical system tuned to resonate at half the power frequency, the current rush being considered torsionally equivalent to a pulsating current of half frequency, and during the surge does not remain closed long enough to operate the breakers. The unbalance of inrush current is used to prevent operation in an American relay. In this two coils (both of which must be energised to cause tripping) are fed by metal rectifiers connected in opposite senses. The pulsating, almost-unidirectional inrush currents only cause current in one coil, while alternating fault currents energise both.

The harmonic content of the current rush is separated by means of filters and used to control a restraint winding in another American design. The adjustment is such that while fundamental frequency currents cause rapid operation, even long inrush currents are reported ineffective.

One recent British system relies on the direct component of current rush to keep saturated

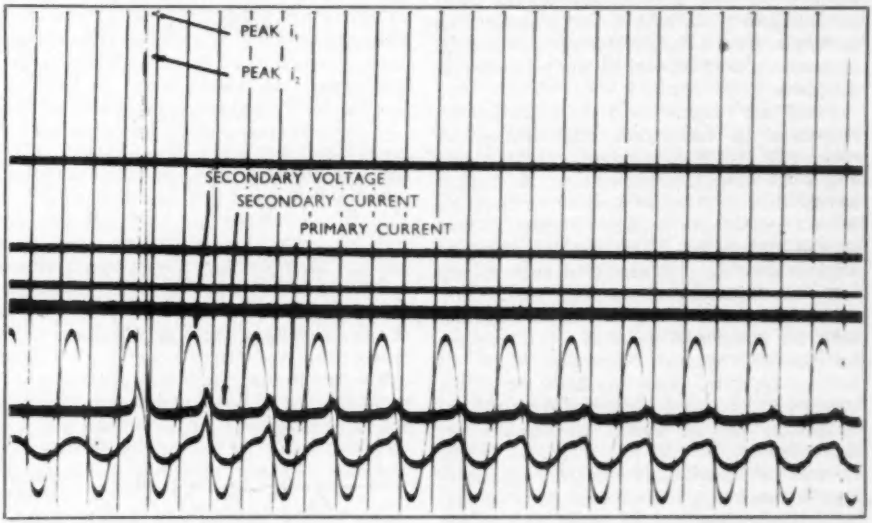


Fig. 7. Oscillogram showing the effect of current inrush on a transformer in the supply circuit of the transformer being switched

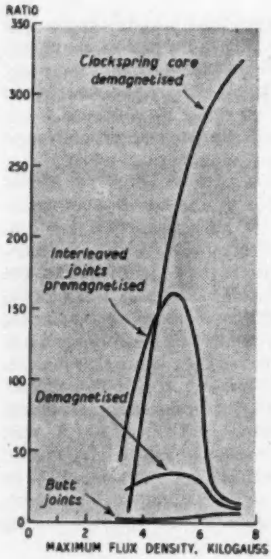


Fig. 8. Curve showing ratio of first peak of current to normal peak current

The descriptions given above are in all cases much over-simplified and are condensed from the designer's papers and manufacturer's literature. It is unfortunate that very little operating experience has been published to date.

Fuse Ratings

It is common for small distribution transformers, potential transformers and the input to radio power packs to be fuse protected. In each case, while adequate protection is desired, unnecessary fuse blowing is troublesome and expensive.

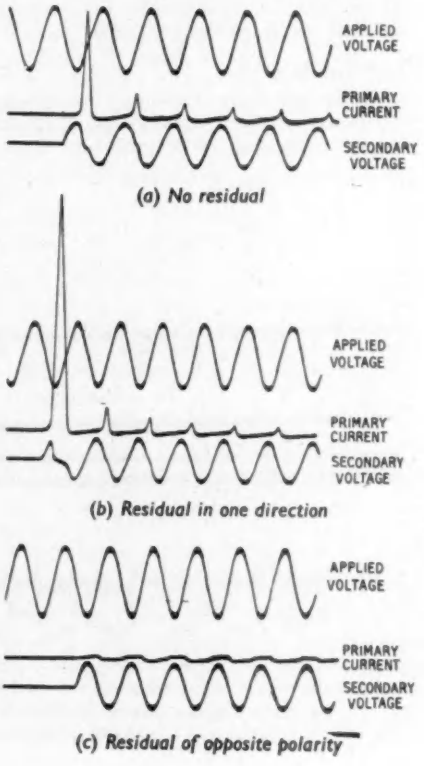
Fuses are largely used for short-circuit protection in distribution transformers. A rough rule in B.S. 88 suggests a rating of one and a half times full-load current. As regards inrush currents an American recommendation is for a fuse which will carry 12 times full-load current for $\frac{1}{10}$ sec. This type of rating is sensible since the relationship between normal and short-time fusing currents varies considerably for different fuse elements. Calculations are possible in terms of i^2t, a constant for the fuse element dependent upon its thermal capacity. The equivalent i^2t to the inrush current may be obtained by graphical integration of an actual oscillogram or, approximately, by analytical methods. Inrush currents are a particularly important consideration in the fusing of potential transformers, since the loading is kept small to preserve accuracy and the inrush current may be many times the normal current.

Radio transformers are often fused by primary cartridge fuses. Some manufacturers of these give an estimate of the maximum currents permissible in the first half cycle (often of the order of 10 to 16 times the rated current, although different elements giving 30 times are available). In severe cases the use of a fuse of high thermal capacity devised by E.R.A. is recommended. In this the fuse wire proper is enclosed by a quartz tube and surrounded by a Nichrome spiral, which is in series with the fuse wire. When the wire is heated by the Nichrome spiral it will fuse at one-third of its normal rating. A time-lag is introduced by the quartz tube so that the element will stand high currents of short duration, but will blow on short sustained overloads.

Conclusions

It has been shown that, while analytical calculations may be made for the inrush a transductor, which, normally saturated, is caused to be moved out of saturation by a large alternating current. Thus, while a fault current will operate the relay connected to a secondary winding of the transductor within four cycles, inrush currents do not do so.

Fig. 9. Oscillograms for a transformer with Crystalloy stampings, showing the effect of remanent magnetism on current inrush



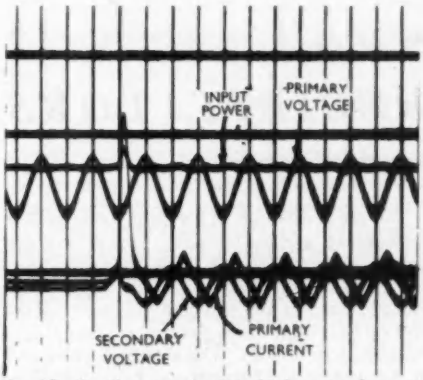


Fig. 10. Oscillogram showing higher steady state current in a butt-jointed core

current, these are usually lengthy, and if a peak current is required for breaker settings, limits to it may be obtained by use of equations (5) and (8). The step-by-step method quoted can give very good results and where a plot is required is most suitable. Calculations of fuse i^2t may be made from this or a practical oscillogram by graphical integration, but the simple rule of 12 times load current for $\frac{1}{10}$ sec. is usually sufficient.

If trouble is experienced with power transformers, it may be cured by switching on the high-voltage winding or, very effectively, by resistance switching. An alternative approach is to adjust the protective relays, or to fit one of the special relays available if the trouble experienced is sufficient to warrant this. For small transformers, a condenser in the secondary to cause partial demagnetisation upon switching off may be easily fitted and will reduce the current surge to safe limits.

It is interesting to note that high inrush currents are often a sign of a well-constructed transformer, bad jointing reducing the remanent flux and thus the probability of high transients. The provision of gaps for this purpose has a severe adverse effect on the transformer efficiency and is definitely bad design. With the modern development of grain-orientated core materials (which are not significantly different from their predecessors with regard to this phenomenon), wound-core units, with even smaller effective gap, are being built. To counteract this it is expected that the coils will be shorter and of wider diameter, reducing the maximum possible transient current.

Inrush currents constitute a nuisance rather than a potential danger. They cause false operation of protective systems and in certain circumstances even interruption of supply. They seldom cause damage to a correctly designed transformer. Thus, there is no need to take universal precautions, but only where trouble has been experienced on switching or fuses blown more often than is tolerable.

The author wishes to express his thanks to Professor Greig for his interest and kindly encouragement in this work, and for the facilities granted in the Department of Electrical Engineering, King's College, London. He also wishes to thank the Senate of the University of London for permission to publish work which was submitted for his master's degree in that university.

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CALCULATING R.R.R.V.

CALCULATION of the rate of rise of re-striking voltage at a given position in a system is a necessary preliminary to circuit-breaker selection. A recently published E.R.A. report (G/T261, by J. A. Callow) discusses a simplified method of carrying out this calculation which may be of value in reducing the amount of arithmetic involved.

When information regarding the circuit-breaker location is given only in the form of the system parameters R, L and C, the practice up till now has been to calculate the form of the re-striking voltage transient, plot the resulting curve, and then determine graphically the slope of the steepest tangent. The report describes a method making use of previously prepared curves, which gives r.r.r.v. with an accuracy sufficient for most practical purposes, and with a minimum of calculation. It has the added advantage that the parameters are expressed in the convenient form of percentages on a given base MVA.

This method of calculation should be particularly valuable where a rapid survey is required to determine which of a number of different conditions are those which set the limits. These limiting cases may then be more closely examined by complete analysis, in which the factors neglected in the wider survey are taken into account.

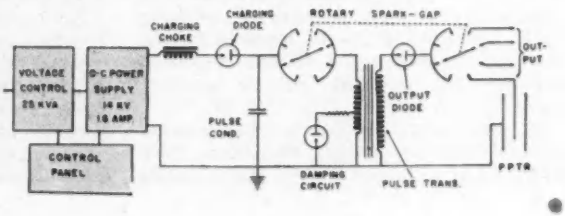
Power Supply for *PRECIPITATORS*

Pulse System claimed to give improved efficiency

THE characteristics of the d.c. supply to electrostatic precipitators can make a considerable difference to their efficiency of operation and working. Conventional methods of applying the high voltage are generally based on Cottrell's pioneer work and consist essentially of a transformer and rectifier equipment, usually with an unfiltered output. A new system has, however, recently been developed —as reported in *Electrical Engineering* of March 1953, in a paper by Mr. H. J. White— which uses pulse principles and technique. At first sight such a system might appear to be somewhat elaborate, but it must be remembered that collection efficiency depends both on the magnitude and on the shape of the applied wave, and the former should be made as large as possible. If, for example, smoothed d.c. were to be used, the low flashover voltage would make it unsuitable for most precipitator applications; but both full-wave and half-wave unfiltered or pulsating rectified voltages have higher sparking values and are much more stable in operation. The characteristics of these latter systems are, however, dictated by the waveform and frequency of the incoming supply. The pulse system, however, allows for precise adjustment and control both of duration and frequency, which in turn enables the precipitator to run at maximum efficiency. Other advantages claimed are higher peak voltages, inherent current-limiting action during precipitator spark-over, greater degree of electrode sectionalisation and higher overall efficiency.

Pulser Operation

In some respects, the system used is similar to that developed for high-power microwave equipment during the war. A schematic circuit diagram is given below. It can be seen that the basic circuit is that of the line-type pulser in which energy is accumulated in a capacitor over relatively long periods and then discharged rapidly into the load, so that the output consists of a series of uniformly spaced pulses.



The set is rated at 70 kV peak voltage, 300 milliampere average current, 15 kW average power, approx. 480 c/s pulse frequency and 150 microsecond pulse duration. Four commutated outputs are provided to permit operation of four separate high-tension precipitator sections from one set. The electrical operation of the pulser is characterised by a desirably high overall efficiency of about 70%.

Pulse frequency is easily adjusted by means of a variable-speed motor on the rotary spark gap, and precipitator sparking is reflected in the pulse circuit by a momentary increase in the pulse discharge current, but with proper adjustment this produces little or no effect in the charging circuits.

Practical Tests

Extensive field tests of the effectiveness of this pulse system of energisation have been carried out on a representative fly ash precipitator. These tests were carried out over a period of about one year and included many direct comparisons with the conventional rectifier type of equipment, which was also installed as a regular part of the precipitator unit. Briefly, it was found that for the same degree of sparking in the precipitator, the peak voltage was several kV higher and the corona current 20 to 35% higher for the pulse system. The higher permissible current and the voltage, in turn led to definite improvement in the precipitator efficiency, the actual precipitator loss being reduced by 50 to 60% when using the pulse system as compared with the normal rectifier method.

Doubts as to the reliability of the equipment were largely set at rest by the fact that the year's usage proved perfectly satisfactory with the experimental unit operating on a large commercial fly ash precipitator.

Hydro Power in Canada

Exploitation Progress in 1952

THE gradual change, within the present century, in the economy of Canada from a largely agricultural to an industrial country, has been largely dependent on the development and exploitation of water power. For this reason the annual report of the Department of Resources and Development is always of interest. The present situation as regards the Provinces and Territories is shown in tabular form in Table I.

TABLE I. AVAILABLE AND DEVELOPED WATER POWER IN CANADA AT END OF THE YEAR 1952

Province or Territory	Available 24-hour Power at 80% efficiency—H.P.		H.P. Installed Capacity
	At Ordinary Min. Flow	At Ordinary 6-Mth. Flow	
1	2	3	4
Brit. Columbia	7,023,000	10,998,000	1,432,858
Yukon and N.W.T.	382,500	814,000	31,450
Alberta	508,000	1,258,000	207,825
Saskatchewan	550,000	1,120,000	111,835
Manitoba	3,333,000	5,562,000	716,900
Ontario	5,407,000	7,261,000	3,948,466
Quebec	10,896,000	20,445,000	7,263,621
New Brunswick	123,000	334,000	135,511
Nova Scotia	25,500	156,000	162,455
Prince Edw'd Is.	500	3,000	2,299
Newfoundland	958,500	2,754,000	292,660
Canada	29,207,000	50,705,000	14,305,880

In this table, the power estimates of cols. 2 and 3 have been calculated on the basis of 24-hour power at 80% efficiency. Col. 2 lists the estimated continuous power ordinarily available at periods of low discharge; the "Ordinary Minimum Flow" is based on the average of the mean flows for the two lowest periods of seven consecutive days in each year covered by the period of record. Estimates of dependable maximum power, Col. 3, are based upon the "Ordinary Six-Months Flow" which is the computed dependable stream flow usually available for at least six months in the year under existing flow conditions. On rivers for which there are no specific discharge records, estimates of flow are made from all available pertinent information relating to run-off in the area.

It should also be noted that these figures are based on existing power. Variations in arrangement of water systems and the investigation of remoter sources of power may well result in higher figures, and large reserves of potential power, albeit somewhat remote from existing load centres are still available.

Progress in Development

Keeping pace with the expansion of general industrial activity throughout Canada, the record total of 1,066,250 h.p. of new hydraulic turbine capacity was brought into operation in 1952; also active construction was proceeding on other developments with a total ultimate capacity of more than 3,000,000 h.p. New developments were widely distributed throughout Canada, although the greater number were located in Quebec. Projects which have been undertaken in rather remote locations indicate the future economic value of other undeveloped sites in unsettled regions. Construction in the field of power distribution and in the building of thermal-electric plants also was active.

In British Columbia, the B.C. Electric Co. Ltd., completed the powerhouse at Wahleah Lake, with the commissioning of the single unit of 82,000 h.p. at 2,000 ft head. A fourth 62,000 h.p. unit has also been ordered for Bridge River. Alcan have completed the Kenney Dam and storage has begun for this 2,000,000 h.p. project. About four miles of the 25 ft dia. tunnel for the first part of the scheme and about one half of the excavation for the underground powerhouse have been completed. A 420,000 h.p. development in 4-105,000 h.p. units is also making rapid progress on the Pont d'Orielle River. This is being sponsored by the Consolidated Mining and Smelting Co.

In other provinces progress has been good although less sensational. At Beauharnois on the St. Lawrence River, Quebec increased its capacity by 222,000 h.p., while Alcan, completed the five-unit, 275,000 h.p. plant at Chute-du-Diable, and brought into operation one unit of 55,000 h.p. at Chute-a-la-Savanne, a few miles downstream. When completed this latter plant will also have a total installed capacity of 275,000 h.p. Price Bros. and Co. made good progress on two hydro plants on the Shipshaw River, one of 70,000 h.p. and one of 9,000 h.p. with operation scheduled for this year.

The Manitoba Hydro-Electric Board completed the final two units of its six unit 114,000 h.p. Pine Falls development, and has begun preliminary construction on the development of 80,000 h.p. at McArthur Falls, to come into

operation in 1955. The board is also planning to build a steam plant of 60 MW at Brandon for commissioning in 1956. On the Winnipeg river, the installation of the sixth and final unit of 37,500 h.p. at Seven Sisters was completed by the Winnipeg Electric Co. The City brought into operation a 15 MW steam turbine unit and a further thermal set is being installed.

In Ontario, it is hoped to finish the eighth and last 33,000 h.p. unit in the Otto Holden station this year, and good progress was made on the Sir Adam Beck-Niagara No. 2 plant, which is scheduled for initial operation in 1954.

The two large steam-electric stations of the Ontario H.E. Commission were nearing completion. At Windsor, the second 66,000 kW unit was placed on line in February, 1952, and the plant of 264,000 kW in four units will be completed in 1953. At Toronto, two units totalling 188,000 kW were brought into operation and the fourth unit is scheduled for May, 1953; two units will operate temporarily at 25 cycles, but when these are converted to 60-cycle operation the plant will be rated at 400,000 kW.

In New Brunswick, construction of the 27,000 h.p. development on the Tobique River, by the New Brunswick Electric Power Commission, was up to schedule for completion early this year. The Nova Scotia Power Commission completed its Gulch development on the Bear River, consisting of one unit of 8,600 h.p. For installation in its steam plant at Cantleys Point, Trenton, a 20 MW unit is on order with completion scheduled for 1955. A further steam plant, owned by the Nova Scotia Light and Power Co. at Halifax, is to be extended by a unit of 22·5 MW (scheduled for operation this year), and a further 27·5 MW set is on order.

Saskatchewan is more dependent on thermal power for its electricity supplies than the remainder of the provinces, although a 30,000 h.p. hydro unit is to be installed in the Ghost plant on Bow River and preliminary construction has begun on a 22,000 h.p. unit at Bearpaw. In Alberta two 30 MW steam sets are to go in at Edmonton and Medicine Hat, and during the year a 25 MW set went in at Saskatoon and a 10 MW unit at Prince Albert. Present plans call for additions of 20 MW at Estevan (1954-56) and 50 MW at Saskatoon.

Exploitation of the water potentialities in Newfoundland is also being actively pursued. The Newfoundland Light and Power Co. brought into operation its new plant of 7,500 h.p. on Horse Chops River, and a second 10,000 h.p. plant on the same river is being built to come into operation this year.

THE EFFICIENCY RACE

Highest Performance now 29·95%

OVER 1,300,000 tons of coal were saved last year by increased efficiency in the steam stations of the British Electricity Authority.

The overall average thermal efficiency of these stations, nearly 300 in all, for the calendar year 1952 was 22·61%, compared with 21·79% in 1951. The improvement in thermal efficiency (0·82%) not only represents a great saving in coal consumption, but an economy in cost of over £3,000,000.

The table lists the 20 steam power stations of the Authority with the highest overall thermal efficiency for 1952.

Three stations, namely Brunswick Wharf, North Tees C and Huncoat, which did not operate throughout the whole year, achieved thermal efficiencies for their periods of commercial operation of 28·41, 26·93 and 26·60 respectively.

New power stations and new plant in older stations make a highly important contribution to national fuel economy. Well over one-tenth of the Authority's present total output capacity is provided by plant over 25 years old. The replacement of these old machines will save substantial quantities of coal and money.

The present plant programmes of the Authority aim to reach an overall average thermal efficiency of 26% in 1960.

Station	Thermal Efficiency (%)
Littlebrook B	29·95
Dunston B II	29·65
Portobello H.P.	29·46
Skelton Grange	29·19
Bromborough	28·88
Stourport B	28·84
Battersea B.	28·71
Poole	28·31
Braehead	27·79
Agecroft H.P.	27·20
Blackwall Point	26·66
Clyde's Mill H.P.	26·66
Fulham	26·63
Cliff Quay	26·63
Stuart Street H.P.	26·47
Brimsdown B, H.P.	26·41
Hams Hall B	26·24
Llynfi	26·23
Staythorpe	26·18
Croydon B	26·02

Coal Handling on a Grand Scale

Castle Donington Installation to Deal with 960 Tons per Hour

THE illustration shows a perspective arrangement of the extensive coal-handling plant to be installed by Babcock and Wilcox at the new Castle Donington power station, scheduled for operation in 1955. The installation will be one of the largest in the country with a capacity of 960 tons/hr to the boiler house bunkers and a storage capacity of more than 500,000 tons.

As the coal must be rail borne, initially three-side discharging wagon tipplers will be included, suitable for handling wagons up to 35 tons gross weight at a rate of 15 wagons per hour.

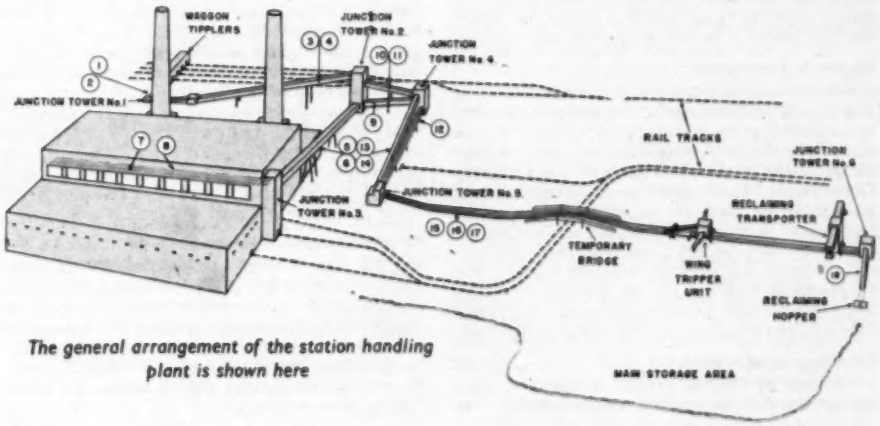
The coal is taken from the tippler hoppers via "Sherwen" electric vibrating feeders and bifurcated chutes to belt conveyors Nos. 1 and 2, which transport it under the tracks to No. 1 junction tower. Two conveyors (3 and 4) take it to No. 2 tower at a height of about 90 ft above ground level. This tower also contains the screening and crushing plant and also the sampling equipment, and forms the key point of the system as coal may be diverted to or reclaimed from store or fed into bunkers or store as required. For direct consumption the coal is transferred from 3 and 4 conveyors to 5 and 6, and from storage it may be recarried by 10 and 11. Coal direct to store travels via 9 through junction tower No. 4.

Conveyors 5 and 6 are each fitted with a separate tandem drive and transport coal to No. 3 tower—an extension to the bunker bay—delivering at a height of about 125 ft above ground-level to the station conveyors, 7 and 8.

From No. 2 tower to the remote end of the coal store there are three paths; one for stocking out and two for reclamation. The stocking out conveyor (9) and the reclaiming conveyors (10 and 11) run from No. 2 to No. 4 tower (about 155 ft), where the direction of travel changes through 90°, conveyor 9 delivering to conveyor 12 and conveyors 10 and 11 being fed from 13 and 14. A further right-angle bend occurs at tower No. 5, where conveyor 12 connects with stocking-out conveyor (16) and reclaiming conveyors (15 and 17) connect with 13 and 14. The run between junction towers 5 and 6 being some 2,060 ft.

Owing to the lengths involved, special consideration had to be given to both temporary and permanent adjustment of belt slack and to the maximum permissible belt stress on starting. The arrangement adopted—patent 626597—involves a main drive of 130 h.p. at the delivery end of each conveyor, pulling on the loaded belt, with a 60 h.p. auxiliary drive on the other end, pulling on the return side. This reduces the belt tension at starting considerably.

Storing-out is by means of a special wing tripper with spans of 44 ft either side, and distributed by bulldozers and carry-alls. For reclaiming a 14-ton electric travelling crane, with a total span of 110 ft, is used, running over the same tracks as the tripper; or by bulldozing the coal into a ground hopper which feeds No. 5 tower via conveyor 18 and tower No. 6.



The general arrangement of the station handling plant is shown here

overseas news

Shawinigan's Plans

The Shawinigan Water and Power Co., will increase its hydro-electric capacity by about 150,000 h.p. within the next two years, Mr. J. A. Fuller, the president, told stockholders at the annual meeting a few days ago. An additional generating unit will be installed at each of the company's three generating stations —Rapide Blanc, Trenche and at the St. Maurice Power Corporation's plant at La Tuque, on the Upper St. Maurice River. In addition a new high voltage transmission line will be built from La Tuque to Trois Rivieres to help carry the increased power from the Upper St. Maurice generating plants. For projects already planned up to the end of 1955, the total capital expenditure will amount to $38\frac{1}{2}$ millions. The company also has under consideration other sources of power supply and some time during this year it will decide which project to undertake next. Meanwhile it is also seeking to increase its tariffs to consumers.

Serving the Consumer

Consumer goodwill can be a valuable asset, and efforts to develop it have often been made by the Electrical Industry. Such an instance was the effort last month of the Hydro-Electric Power Commission of Ontario. This related to four farm families on Thorah Island in Lake Simcoe, to which a supply is normally given by submarine cable by the Commission. Unfortunately a fault developed in the cable and the farms were without a supply for a few days. But the lake was ice covered, although not solid enough to hold repair crews, so the Commission ordered portable generators to be flown in to the farms by helicopter. Three sets were sent, and the farmers instructed on their operation. When the ice clears, allowing repair crews to work from boats, the submarine cable will be checked and repaired.

Second Thoughts

A proposed customs tariff amendment involving millions of dollars worth of imported electrical motors and other motive power for imported machinery has been dropped from the Canadian budget. The explanation is that the Canadian Government had encountered difficulties in attempting to prepare the necessary amending legislation. It had been intended to increase the duty from $7\frac{1}{2}\%$ to $22\frac{1}{2}\%$ on electrical and other motors imported from the United States. The Government had sought to try and form an amendment which would result in no increases in the tariff, but found it could not do so at that time.

Over to Underground

Another of Canada's cities is taking a more favourable view of underground networks. This time it is Regina, in Saskatchewan, where the city council has given preliminary approval to an underground power cable construction programme costing approximately $225,000 for 1953.

Cost of lead covered cable for the programme is estimated at $130,000 and for construction of duct lines and manholes and installation of cables at $95,000. The major part of the underground construction is a large lead from the powerhouse to No. 6 sub station in North Annex, to supply an oil refinery. The remainder of the cable is for use in the new Lakeview sub-division, where, because of the layout of streets and lanes, it is almost impossible to construct pole lines without putting guy wires into private property, apparently.

Investigation Sought

A full scale investigation of the activities of the Hydro Electric Power Commission of Ontario has again been demanded by the provincial Liberal leader, Mr. A. Wren. He asserted that industry was moving away from Ontario because of the high cost of power. The commission had become so big it could and would, dictate government policy and elect or defeat governments, Mr. Wren argued. But his chief complaint concerned the increased cost of the frequency standardisation programme to which we have already referred.

U.S. View on Seaway Awaited

Although the Federal Power Commission completed some weeks ago its hearing into the application of the New York State Authority to be named as the U.S. body licensed to co-operate in the St. Lawrence Seaway and Power project, the lack of any announced decision is causing officials in Ottawa to feel that the matter is being deliberately held up in order that the U.S. Congress may be given a new chance to authorise American participation in the scheme. From reports it seems that many members of the Eisenhower Administration are favourably inclined towards U.S. co-operation. Quite possibly the scheme will be one of the major topics when the Canadian Prime Minister, Mr. St. Laurent, visits President Eisenhower on May 7. But a Canadian view is that there can now be no move on construction of the project this year.

Seeking Development

The Norwegian Government has introduced a Bill providing for an extra grant of 15 million crowns for the development of hydro-electric power in North Norway. It is proposed that one-third of this sum be used for helping enterprises in difficulty owing to price increases, and the remainder for establishing new projects.

New Greek Station

It is hoped that this month will bring the operation of the first of four new electric power projects in Greece. This is the steam power station at Aliveri, on the island of Euboea in eastern Greece, which is to have an installed capacity of 80 MW, consisting of two turbo-generators each supplied by two boilers designed to burn the lignite which is mined nearby. Initially, only one set will be in operation, but full capacity should be attained later this year. A related project for the distribution of the power consists of 711 miles of 150 kV transmission lines and 22 sub-stations, for which scheme the consulting engineers are Merz and McLellan. Mr. C. L. Blackburn, B.A., M.I.E.E., partner of that concern, tells us that the first section of this grid system, some 75 miles in length, linking the Aliveri station to Athens, was made live last month. Surveys have been completed for the remainder of the system and further constructional work is in progress. It is expected that the grid system will be completed by the end of March, 1954! Most of the equipment has been supplied by Italy as war reparations.

T.C. Take Over

The electricity distribution system, including the street lighting, of the municipal area of Germiston in the Transvaal, has been taken over from the Electricity Supply Commission of South Africa by the City Council. Certain industrial areas, however, have been excluded for the time being at any rate and will continue to be supplied by the Commission. The purchase price was £400,000. The Council is continuing to take a bulk supply from the Commission at six points of input, but it is proposed to re-design and reconstruct the distribution system, while providing a 33 kV primary system so that a bulk supply can be taken at a single point in the future. The maximum load on the Council's system is now approximately 15,000 kW. For its first year of operation after the take-over the Council estimates a surplus of £12,000. The town of Germiston, nine miles from Johannesburg, has an area of 51 sq miles and is the third largest city in the Transvaal.

Factory Scheme

The total cost of setting up the proposed electronics and telecommunications factory at Bangalore will be about Rs. 70 million. This answer was given in the Indian Parliament recently by Mr. Satish Chandra, deputy Minister for Defence, who added that a contract had been entered into with a French firm, the Compagnie Générale De Telegraphie Sans-Fil, in this connection. In addition to payment to that firm for services rendered, there would be payment in the nature of royalty on actual production on a percentage basis. This would be 3% on the first Rs. 10 million worth of goods, 2% on the second Rs. 10 million worth of goods, and 1% on Rs. 20 million and above. These royalties would be for a period of 10 years.

Aid for Warsak

Following discussions, to which we referred on March 26, Canada has now agreed to allocate to Pakistan, the sum of $3,400,000 out of the Colombo plan for 1952-53, to be expended on equipment and assistance for the Warsak hydro-electric and irrigation scheme. As we previously noted, this project will have an ultimate capacity of 180 MW. Canada is also to provide additional future amounts for the scheme.

Punjab Scheme

A survey will be undertaken this summer for a hydro-electric generating station at the Genthy River waterfall, a few miles from Pauri-Garhwal, in the Punjab. The project, when completed, will enable a large part of Garhwal district to be electrified and irrigated.

Port Augusta Progress

Sir Claude Gibb, managing director of C. A. Parsons & Co., who are supplying the turbo-alternators for the new Port Augusta power station, South Australia, was among recent official visitors to the station site. The party included State Premier, Mr. Playford, and Mr. F. C. Drew, chairman of the Electricity Trust of South Australia. All were impressed with the progress of the work on the power station, the first unit of which is expected to be operating by June next year. Most of the steel work for the station building has been erected and the installation of the first boiler is proceeding. The jetty to be used for unloading heavy machinery and the spur railway from Stirling North are completed. The first of the alternators is due to arrive in May.

N.S.W.'s Needs

An expenditure of at least £70 million in the next five years would be needed to give the State a modern and adequate electricity system, declared Mr. H. G. Conde, chairman of the New South Wales Electricity Commission, when speaking at the opening of the annual conference of the N.S.W. Electricity Supply Engineers' Association, a few days ago. He said any curtailment of the commission's works programme because of financial restrictions would cause a repetition of the critical power position experienced a few years ago. It would be desirable to retain moderate power restrictions this winter, and it was hoped that the public would co-operate. The commission also hoped to institute monthly settlement of accounts instead of quarterly or yearly as at present.

More Snowy Work

Tenders are soon to be called for the major civil construction work for the second stage of the Snowy Mountains hydro-electric project. This includes the T.I. power station for which tenders for the generating plant closed this week. This constructional work includes the Adaminaby-Tumut tunnel, about 15 miles in length, the Tumut Pond dam, and excavation for the power station and main transformer hall. We understand that this work will be segregated into two contracts.

PERSONALITIES

IN THE INDUSTRY

At present generation engineer (operation) for Group I of the London Division of the B.E.A., **Mr. R. S. Atkinson,** A.M.I.Mech.E., A.M.I.E.E., has been appointed chief generation engineer (operation) in the Merseyside and North Wales Division of the B.E.A. in succession to Mr. R. L. Batley, O.B.E., who is now controller of the Midlands Division. Mr. Atkinson has been with the London Division since 1949. Earlier he had served as power station superintendent at Rotherham and Lincoln, after previous experience at Ferrybridge, Bradford and Hull stations.

Mr. R. S. Atkinson

Mr. J. A. Fraser has severed his connection with the English Electric Co., Ltd., Domestic Appliance Division as from March 31. His home address is 6, Capel Gardens, Pinner, Middlesex.

Mr. M. K. Kaye, press officer of E. K. Cole, Ltd., is shortly to relinquish his post with Ekco to become deputy general manager of Turner's Lighter Spares and Components, Ltd.

Mr. Bertram White, technical director of the Federation of British Industries, has resigned as from the end of March to take up an industrial appointment. **Dr. J. E. G. Harris,** D.Sc.Lond., B.A. cantab., who will succeed him temporarily as acting technical director of the F.B.I., has had a long association with Imperial Chemical Industries Ltd., from whose service he has now retired.

Recent visitors to the North Western Division of the B.E.A. were **Sir John Hacking,** deputy chairman (operation) of the Authority, **Mr. V. A. Pask,** the chief engineer. **Mr. C. E. H. Verity,** deputy chief engineer (generation station construction) and **Mr. E. S. Booth,** power station construction engineer. During their visit they inspected the sites of the new power stations at Chadderton and Carrington, our accompanying photograph being taken at a site progress meeting at the latter station.

The directors of Crompton Parkinson Ltd., announce with regret the resignation of **Mr. Albert Parkinson,** M.B.E., as a joint managing director of the company, a position which he has occupied since its formation in 1927 by the amalgamation of F. and A. Parkinson Ltd. with Crompton and Co., Ltd. Mr. Parkinson will remain chairman of the company and, in accepting his resignation as a joint managing director, the board has recorded their high appreciation of the outstanding services he has rendered to the company, and understand his desire to be freed now from executive responsibilities.

Mr. H. E. Jackson has relinquished the chairmanship of the Metals Division of Imperial Chemical Industries, Ltd.

In the reorganisation of Henry Meadows Ltd., a number of new appointments have just been made. These are as follows: **Mr. E. H. L. Cooper** to be general works manager; **Mr. J. R. Threlfall** to be production manager; **Mr. G. Metcalfe** to be production controller; **Mr. D. E. Mallet** to be chief inspector, and **Mr. H. D. Prescott** to be assistant chief inspector.

The National Coal Board have appointed **Mr. A. Whitaker,** O.B.E., to be director of extra-mural research. He will be responsible to the director general of research, Dr. W. Idris Jones, at the Board's headquarters. During the war Mr. Whitaker was with the Parnall group of companies.

Recently elected chairman of the Electric Water Heater Manufacturers' Association for the current year is **Mr. F. L. Humber,** of Ferranti Ltd. (he succeeds Mr. Raymond Berry). **Mr. K. R. Taylor,** of Santon Ltd. is the new vice-chairman of the association.

Mr. E. H. Maltby, general manager of Sloan Electrical Co., Ltd., has now joined the board of directors of that company.

Left to right, Mr. R. Watson Smyth, Mr. A. R. Cooper, Mr. J. Shepherd, Sir John Hacking and Mr. V. A. Pask at the progress meeting

Following the retirement of **Mr. C. March,** M.I.E.E., to which we referred on March 26, the Eastern Electricity Board has merged the districts of Finchley and Hornsey as from April 1, and the new district, which will cover the boroughs of Finchley and Hornsey and the urban district of Friern Barnet, will have its headquarters at Crouch End Broadway, N.8. **Mr. C. Bradley,** M.I.E.E., at present manager of the Finchley District, which already includes Friern Barnet, has been appointed manager of the new Hornsey District. In 1931 Mr. Bradley was appointed by the Dumfries County Council as constructional engineer in connection with the county electrification scheme. He eventually became the sales engineer to the County Council and went to the Finchley undertaking in 1936 as 'consumers' engineer. He was concerned with the extensive sales development programme adopted by the Council, in January, 1943; was appointed deputy to the general manager and engineer, and was finally appointed general manager and engineer immediately prior to nationalisation.

Mr. C. Bradley

At Brook Motors' annual sales conference held recently at Huddersfield, ten people received awards for the completion of 25 years' service with the firm. Amongst them was **Mr. John L. Brook,** vice-chairman and joint managing director of the firm, younger son of the founder, **Mr. Ernest Brook,** who presented the awards. Other recipients were: **Miss H. Poole,** winding supervisor; **Miss H. Brass,** winder; **Miss K. Bamford,** order printing; **Mr. R. Stott,** stator builder; **Mr. S. Halstead,** rotor winder; **Mr. E. R. Stott,** no load test; **Mr. H. L. Armitage,** Glasgow Sales Office; **Mr. P. Parr,** foreman sheet metal; and **Mr. H. Ellis,** Huddersfield Sales. At the ceremony **Mr. F. V. Brook,** managing director, was in the chair. Mr. J. L. Brook proposed a vote of thanks to the founder, and Mr. Percy Parr seconded this.

Mr. E. Brook, founder of Brook Motors, presents an award for 25 years service to Mr. John L. Brook

Appointed as the London sales manager for Dowding and Mills, Ltd., is **Mr. W. L. Henderson,** A.M.I.E.E., who has relinquished his secretarial post with The Engineers Guild, Ltd., after four and a half years' service, as we noted on March 19. Mr. Henderson received his early training with W. T. Henley's Telegraph Works Co., Ltd., after which he was engaged as a commercial engineer with the former Central London Electricity Co., Ltd. The end of his war service found him appointed as personnel selection officer to the Corps of Royal Engineers and following this, two years were spent as assistant secretary (admin.) to the Association of Supervising Engineers.

Mr. W. L. Henderson

The Ampere Medal presented by the Societe Francaise des Electriciens of France has been awarded this year to **Monsieur H. Andre.** This medal, of which one only is presented annually, is awarded in consideration of a life's work in some branch of the electrical field. It will be recalled that Monsieur H. Andre is the inventor of the modern form of silver-zinc accumulator, the Commonwealth rights of which are held by Venner Ltd.

Two newcomers to the demonstration team of the English Electric Co., Ltd., are **Miss Barbara Hanforth,** of Leeds and **Miss Joy Stead,** of Romford. Miss Hanforth will work from Leeds where she has lived all her life and where she completed her training at the Yorkshire College of Housecraft. In 1951, Miss Hanforth won the E.D.A. public speaking competition with her presentation of a lecture entitled "Leisure Hours."

After six months in Edgware General Hospital in consequence of injuries received in the Harrow-Wealdstone rail smash, **Mr. E. H. Wale,** secretary of the Cable Makers Association, has returned to duty, but is still receiving medical treatment.

For health reasons, **Mr. J. Watson** has been forced to relinquish his duties as manager of the Cardiff Supplies Division branch of Crompton Parkinson, Ltd. In due course he will take up a post in the Lighting Section in London. The new manager at Cardiff is **Mr. S. R. Edwards,** who was manager of the firm's Supplies Division depot at Portsmouth. He joined Crompton Parkinson, Ltd., in January 1933 as a London salesman in the Lamp and Cable Department, until his appointment in April 1946 as Portsmouth depot manager. Crompton Parkinson, Ltd., also announce that **Mr. F. H. Beasant,** B.SC.(HONS.), M.I.E.E., M.I. MECH.E., will be leaving the company to join the board of the Anti-Attrition group of companies.

Three part-time members of the Yorkshire Electricity Board whose term of office expired on March 31 have not been re-appointed. They are: **Mr. A. R. Baines,** C.B.E., F.T.I.; **Mr. H. F. Sherborne,** M.C., M.A., COMP.I.E.E., COMP.I.MECH.E., A.I.MAR.E., A.I.N.A., and **Councillor H. Fairbotham,** J.P. At the time of going to press their successors had not been named.

The end of last month brough the retirement of **Mr. F. H. Williams,** B.SC.(TECH.), M.INST.C.E., M.I.E.E., from the position of hydro-electric engineer to the South West Scotland Division of the B.E.A. Educated at the Manchester Grammar School and the College of Technology, Manchester University, he became engineer-in-charge at the Marylebone power station of the Great Central Railway Co. in 1908. Two years later he was placed in charge of the testing laboratory of Manchester Corporation Electricity Department. Between 1911 and 1913 he was first personal assistant to the resident managing director of Switchgear and Cowans, Ltd., and later became their works manager. In 1914 he joined the staff of Merz and McLellan, being engaged in various capacities in connection with railway electrification and power station construction schemes. But in 1934, when the first stage of the Galloway Water Power Co.'s scheme was nearing completion, he was appointed manager of the company, and was thereafter responsible for the starting up and operation of the stations and the maintenance of plant in this pioneer development.

Mr. F. H. Williams

Mr. P. V. Gurr, J.P., district manager to the South Eastern Electricity Board at Folkestone, as the representative of the Folkestone Chamber of Trade, has been elected Chairman for the ensuing year of the Railway/Traders' Panel for Kent, Surrey, and Sussex, set up under the Railway Act, 1921.

We offer our congratulations to **Mr. Sebastian Z. de Ferranti,** elder son of Sir Vincent and Lady de Ferranti, who is to marry Miss Mona H. Cunningham, of Sunningdale, at the Church of St. Mary, Cadogan Gardens, London, S.W.3, today, April 9, at 2.30 p.m.

Mr. H. T. Tomlinson, A.M.I.E.E., has been appointed deputy chief electrical engineer to the War Department, Aldershot District.

Mr. J. W. Rodger, M.I.E.E., managing director of Bruce Peebles and Co., Ltd., accompanied by his wife, returned by "Comet"—B.O.A.C.—from Uganda a few days ago after a six months' world tour embracing Canada, New Zealand, Australia, Tasmania, Ceylon, India, Pakistan, and Southern, Central and Eastern Africa.

The new director of the Cable Makers Association is **Mr. A. H. Carmichael,** BARRISTER-AT-LAW. He succeeds **Sir John Dalton,** now chairman of W. T. Henley's Telegraph Works Co., Ltd. Mr. Carmichael has been director of the Brass and Copper Tube Association for the past 16 years, and had earlier spent five years with International General Electric and seven years with B.T.H.

A member of the Radio Industry Council, and chairman for the second successive year of the R.I.C. Technical Directive Board, **Mr. P. D. Canning** has been elected chairman of the Radio and Electronic Component Manufacturers' Association. He succeeds Mr. Hector V. Slade. Mr. Canning, who joined The Plessey Co. Ltd., in 1933, and was for some years responsible for development and production of transmitting and similar apparatus and for radio installation work, has, since 1948, been engaged on special duties connected with trade association activities and overseas liaison for Plessey.

Mr. P. D. Canning

Due to arrive in this country by air tomorrow, April 10, are two prominent officials of the Brisbane City Council Electricity Department, Queensland. They are, **Mr. E. Sands,** A.M.I.E.E., deputy manager in charge of distribution, and **Mr. C. A. M. Weller,** M.E., A.M.I.E.E., generation engineer. They are coming here on a business visit which will last several weeks, one of the objects being, we understand, to make further investigations concerning a cable contract. It is likely that they will also visit Europe and the U.S.A.

OBITUARY

Mr. H. M. Proud, M.I.E.E., M.I.R.S.E., M.P.W.I., formerly chief commercial engineer to the Westinghouse Brake and Signal Co., Ltd., died on March 30, aged 70. He had been associated with transport since 1902. Later he worked on the installation of power and automatic signalling on the District Railway and Tube lines, and between 1907 and 1914 supervised the signalling installations on the Metropolitan Railway for McKenzie and Holland Ltd. Afterwards he was transferred to the office engineering staff of that company which was subsequently absorbed into the Westinghouse Brake and Signal Co., and became chief commercial engineer in 1932.

Mr. J. D. Simmons, B.SC.(ENG.), A.M.I.E.E., who had been with the Metropolitan-Vickers Electrical Co. at Sheffield, died on March 30, aged 33.

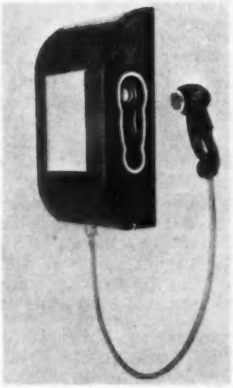
Lt.-Col. P. Stott, T.D., J.P., chairman of James Stott, Ltd., of Oldham, died on April 2.

Mr. J. E. Percival, F.C.A., chairman of Pirelli-General Cable Works, Ltd., died on March 31.

The BUYER'S *Column*

6d in Slot Shaving

INTENDED for use in the cloakrooms of hotels, restaurants, railway termini, etc., the Auto-shaver unit recently introduced by THE AUTO-SHAVE CO., LTD., 48 Warren St., London, W.1, provides electric razor facilities for all after payment of a token charge.



The mechanism is brought into action by the insertion of a sixpenny piece or other coins of differing currencies as desired, after first removing the shaver head from its cradle.

The unit complete comprises a cast aluminium box 12in. by 6in. by 4in. which houses a synchronous motor, the slot mechanism and the disinfecting apparatus. A flexible steel drive leads off the motor to the cast aluminium handle (6½in. long) driving the razor head of the circular cutting type. After use the shaving head is replaced in its cradle where it is automatically disinfected with "Cetavlon," an I.C.I. product.

We understand that it is intended to offer the shaver unit on hire to the various hotels at a low rental which will include installation and maintenance.

The "M" Range of Micro Switches

FIRST models of what is promised to be a full and large range of micro switches are the new miniature "M" micro switches available in three models for light pressure operation from A. F. BULGIN & CO., LTD., By Pass Rd., Barking, Essex.

Each of these models is available with a steel or Bakelite button, the latter, however, can work at a slightly higher voltage to operating mechanism. The switches employ the well-known Bulgin-Acro rolling spring principle with all operating members of beryllium-copper material, fully hardened.

These switches are for arduous duty up to 250 V and up to 1·5 amp (3 amp at 125 V) a.c. rating.

List No.	Op. pressure Grms.	Enclosing dimensions
S530	25-35	1⅛in. × $\frac{13}{32}$in. × $\frac{9}{32}$in.
S531	35-50	" "
S532	50-100	" "

Suffix A indicates stainless steel button.
Suffix B indicates Bakelite button.
Maximum working voltages at 50 c/s across contacts and contacts to E is 250 V.

2 kW Thermodare Heater

IN view of certain problems in the design of heating installations where the need for extra heating facilities are somewhat offset by a severe restriction on the space available for the installation of storage heater units. THERMODARE (GT. BRITAIN, 36 Victoria St., London, S.W.1, subsidiary company of Aberdare Electric Co., Ltd., Dublin, have now introduced a 2 kW model which is priced £15. This new model has exactly the same dimensions as the 1½ kW model which are 21 in. length, 11 in. breadth and 30 in. height.

Cooking Conjunction

NOVEL idea of linking two standard Tricity 528 cookers into one complete double-sized unit with two ovens, four boiling plates, grill chambers, warming cupboards and large utensil storage space has been announced by TRICITY COOKERS, LTD., 109 Kingsway, W.C.2, with the introduction of a simple conversion kit together with the additional cooker at a cost of only £25 19s. Thus the owner of a single 528 cooker can at any time add the second unit.

The Double 528 is also offered as a complete unit for £47 3s., a price which makes it an attractive proposition for the cafe or restaurant owner and, of course, the family which has grown too large for a single cooker.

The Double 528 is in fact two ordinary 528 cookers placed side by side and fitted with the large single unit top plate

Frequency Indication

NEWLY developed by CROMPTON PARKINSON LTD., Crompton House, Aldwych, W.C.2, is a new sensitive bridge-network unit which enables any size of centre-zero moving coil instrument of a range 500-0-500 microamps to be calibrated and used as a frequency indicator.

The network circuit consists of resistors, condensers and inductances arranged in a frequency sensitive bridge with half-wave rectifiers, giving a unidirectional output to operate the instrument.

The network is balanced so that no current flows through the instrument at a pre-determined value of frequency. If the applied frequency differs from the pre-determined value, a unidirectional current proportional to the difference in a plus or minus direction, flows through the instrument and the pointer then takes up a position to indicate the actual frequency.

It is claimed that the new circuit is practically immune from error due to abnormal wave form and therefore gives greater accuracy than rectified bridge circuits with a calibration which is true for only one wave form at one voltage.

The bridge network is contained in a separate box approximately 7in. by 5in. by 4in. deep. The unit is standardised for; 45-65; 46-54; and 56-64 cycles at the present time and is for voltage: 100-120 V; 200-240 V.

Side-street Sodium Lighting

A NEW open refractor plate lantern for side-road lighting has been introduced by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. Arranged for top entry mounting at a height of 13 ft. to 15 ft. with a spacing of 100 ft. to 120 ft. apart in roads up to 30 ft. wide, the new lantern houses a 45 W or 60 W Osram sodium lamp.

The lantern is essentially a one-piece open inverted "Perspex" bowl, to the sides of which are bonded "Perspex" refractor plates. Both inner and outer surfaces of the refractors are smooth, to facilitate cleaning, while the ends of the bowl have a rimpled finish. On the inside of the lantern, a cast aluminium spider carries the tapped mounting boss, lamp steady and porcelain terminal block. The porcelain B.C. lampholder is mounted directly on the inner surface of one end of the "Perspex" bowl and is wired with heat-resisting insulated wiring to the terminal block. An earthing screw and porcelain cable cleat are provided.

TRADE PUBLICATIONS

LABORATORY ELECTRONICS.—A coloured broadsheet issued by Sunvic Controls Ltd., 10 Essex Street, London, W.C.2, illustrates the range of electronic laboratory equipment which the firm produces.

DOMESTIC APPLIANCES.—A new publication has been introduced by English Electric Co., Ltd., Marconi House, 336 Strand, W.C.2, which gives details about the various domestic appliances which the company produce. In a strong loose-leaf cover, this "Demonstrator's Bulletin" is being dispatched to demonstrators throughout the country in order that they may have a permanent reference book about E.E. appliances which will be kept continually up to date.

ACCESSORIES.—List No. N.B.1 issued by Metway Electrical Industries, Ltd., King Street, Brighton 1, surveys the range of terminal blocks and strips which are available from the firm.

ALUMINIUM.—Information Bulletin No. 20, issued by the Aluminium Development Association, 33 Grosvenor St., London W.1, is entitled "Painting Practice for Aluminium." It features information on one important aspect of aluminium surface finishing.

ELECTRIC FURNACES.—The latest types, D.3 and D.4, electric furnaces are described in a leaflet which has been issued by A.E.W., Ltd., Imperial Works, High St., Edgware, Middx.

LIGHTING EQUIPMENT.—Specification sheets L 1933 and L 1965, available from Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham, deal respectively with fluorescent lighting fittings and Lundberg door switches.

CABLES.—Cables for telecommunication are described in Publication No. TEL.1, issued by the Telegraph Construction and Maintenance Co., Ltd., 22 Old Broad St., London E.C.2.

REFRACTORIES.—A leaflet issued by the Morgan Crucible Co., Ltd., Battersea Church Rd., London S.W.11, gives information on Morgan M.R. Mouldable, a super-duty plastic refractory.

CIRCUIT-BREAKERS.—A pneumo-hydraulic operating mechanism for large circuit-breakers is described in Publication No. 41407, available from the Brush Electrical Engineering Co., Ltd., Loughborough, Leics.

SOLDERS.—Technical Summary M.52, issued by Multicore Solders, Ltd., Maylands Ave., Hemel Hempstead, Herts, deals briefly with the many Multicore products and gives information on fluxes, fluid solders and solder rings, tap and preforms.

TELECOMMUNICATIONS.—Engineering Bulletin 2313, issued by Communication Systems, Ltd., Strowger Hse., Arundel St., London W.C.2, is concerned with line wiring specifications for P.T.M.-type intercom telephones.

CIRCUIT-BREAKERS.—Leaflet No. 101/2, available from the Belmos Co., Ltd., Bellshill, Lanarkshire, features the company's type SBA flameproof air-break circuit-breaker.

VOLTAGE REGULATORS.—Automatic voltage regulators with electronic control are described in a booklet from the Zenith Electric Co., Ltd., Zenith Works, Villiers Road, Willesden Green, London N.W.2.

NEW LITERATURE

Welding of Ferrous Metals

ed. E. Fuchs, M.A., A.M.I.Mech.E., *and H. Bradley*, M.Met.

MILD steel is the easiest to handle of all the materials being regularly welded today, and a wide range of operations has been developed to deal most efficiently with the differing situations it presents. For other, more difficult, ferrous materials there is a more limited range of possible techniques, but in all cases this volume offers a comprehensive review. It is the middle volume of a trilogy written by I.C.I. welding experts under the general title "Welding Practice," and like its companions it deals with individual materials and problems under the headings metallurgical factors; guidance to designers; welding materials; workshop practice; and special applications. In the present volume, besides mild steel, there are reviewed in this way high tensile low alloy steels austenitic steels, cast iron, and the special problems presented by pressure vessels and by hard-surfacing operations. Throughout the treatment is clear, well illustrated, and eminently practical in its approach. Published by Butterworth's Scientific Publications, 198 pages, 9¾ in. by 7 in. Price 22s. 6d.

Electrical Construction, Testing and Repair

ed. E. Molloy

MAINTENANCE electricians should find this volume of the publisher's "Practical Electrical Engineering" series of the greatest value on their bookshelves. The seven authors who contribute to its pages provide a practical guide to the varied techniques of fault prevention and repair for which electrical equipment calls. Rotating machines are first dealt with, particular attention being paid to mechanical considerations, and then portable electric tools and f.h.p. motors have separate chapters. General workshop methods are described, and there are further sections on X-ray equipment, lead-acid and alkaline accumulators, and domestic electrical equipment. Published by Newnes, 164 pages, 9 in. by 6 in. Price 17s. 6d.

Electrical Measuring Instruments—Part I

by C. V. Drysdale and A. C. Jolley, revised by G. F. Tagg

SINCE the original edition of this classic appeared nearly thirty years ago, there have been many notable advances in measurement engineering. In particular, the improvement in the magnetic materials available has revolutionised many design considerations, and Dr. Tagg has had a major task on his hands in preserving the qualities that have made the book so well known while bringing it up to date.

In its handsomely produced new form Drysdale and Jolley remains a remarkable and comprehensive handbook of information for the designer and manufacturer, with a wealth of historical information to give the background to more recent developments. This first volume deals with general principles and indicating instruments, and devotes considerable space at first to mechanical considerations. Later, after a survey of electrical theory and of the principal electrical materials, permanent magnet, soft iron, dynamometer, hot wire and electrostatic instruments are all considered, with notes on theory and construction, and tabulated comparisons between the characteristics of contemporary and older models. Throughout the work is of the highest quality. Published by Chapman and Hall, 598 pages, 8½ in. by 6 in. Second edition, price 75s.

Worked Examples for Advanced Electrical Students

by D. I. Williams

AS this book is designed for students in Higher National Certificate courses in electrical engineering or studying for Section "B" of the I.E.E. Associate Membership examination, the general omission of theory should provide no difficulties. Providing a guide to the solving of problems set in the above examinations, the author has made a useful selection of problems from all sections likely to be covered, giving a detailed account of the solution of each. A helpful addition is found in an appendix to one chapter, which discusses in comparatively greater detail the principles of operation of the Schrage motor. Similarly, in a second appendix, the mercury-arc rectifier receives like treatment. Published by E. and F. N. Spon Ltd., 160 pages, size 8½ in. by 5½ in. Price 18s.

Mechanics for Engineering Students

by G. W. Bird, B.Sc., A.M.I.Mech.E., A.M.I.E.E.

WRITTEN specifically for students preparing for the National Certificate examination in mechanics, this textbook presents its information in the succinct style most acceptable to those who need a reference volume to reinforce lectures. Every chapter has a reasonably lengthy selection of problems, to which answers are given, and elementary hydraulics is treated as well as the usual mechanical subjects. This welcome fourth edition has been prepared by Mr. F. J. Batson, B.Sc., A.M.I.Mech.E. Published by Pitman, 152 pages, 8½ in. by 5½ in. Fourth edition, price 10s. 6d.

Electrical Engineering (Theory and Practice)

by W. H. Erickson and W. H. Bryant

THIS book is based on material used for instruction in electrical engineering for American civil, mechanical and chemical engineering students, but its scope and subject matter make it a useful addition to the junior electrical engineering

student's library. Treatment is largely non-mathematical, nor is the complex notation used, although an appendix is included on this subject. Covering a wide range, its subject matter may be broadly subdivided into three categories—circuits, machines and electronics. Under the first heading a.c., d.c. and magnetic circuit theory are considered, together with measuring instruments, whilst in the machines section, special machines for control equipment are discussed in addition to straightforward types. Published by Chapman and Hall, 523 pages, size 9 in. by 6 in. Price 48s.

Solution of Problems in Strength of Materials
by S. A. Urry, B.Sc. (Eng.).

WHETHER he likes it or not, a major part of the electrical engineering designer's time is taken up with calculations involving the physical strength of materials, and although much of his calculation is eased by tables and specifications, he is frequently confronted with situations where an *ab initio* attack is required.

This book, although produced for the student, can provide a useful aid in these circumstances, as it consists of a great number of worked-out problems covering most straightforward aspects of materials. For its primary purpose it is excellent. Many students feel much happier if they can see the method of deduction and layout of answer which will best satisfy the examiner, and the scope of the book is sufficiently great to cover the syllabuses of the examinations for the Higher National Certificate in Mechanical Engineering and for the Associate Membership of the professional institutions. It will also be most useful for those proceeding to B.Sc. (Eng.) degrees. Published by Pitman, 381 pages, 7¼ in. by 4¾ in. Price 20s.

BOOKS RECEIVED

The Future of Nationalisation, by H. A. Clegg and T. E. Chester. Develops theme that national ownership is compatible with small-scale operation. Published by Basil Blackwell, 49 Broad Street, Oxford, 211 pages, 7¼ in. by 4¾ in. Price 12s. 6d.

Modulators and Frequency Changers, by D. G. Tucker. Analytical approach for designers of a.m. line and radio equipment. Published by Macdonald and Co. (Publishers) Ltd., 232 pages, 8 in. by 5 in. Price 28s.

British Standards

Enamelled round copper wire (oleo-resinous enamel). Metric edition. *B.S.* 1961 : 1953. *Price 4s. net.* Prepared primarily from the point of view of imports, this standard is, in effect, a metric edition of B.S. 156 : 1951, differing from that standard only in units of dimension and temperature, the latter being in degrees centigrade. All technical details in this standard are taken from B.S. 156 excepting details of wires corresponding with Brown and Sharpe gauges, and the range of diameters covered is from 0·025 to 4 mm.

Projectors for film strip and miniature lantern slides (for educational use and optical lanterns). *B.S.* 1915: 1952. *Price 3s. net.* Recently published, this new British standard covers projectors for 35 mm. film strip and miniature (2 ins. square) lantern slides and optical lanterns for 3¼ in. square lantern slides. Dimensional requirements ensure compliance with a forthcoming standard B.S. 1917, and other details specified include screen illumination, gate temperature, lens revolving power and electrical requirements necessary to ensure safety. It is aimed at ensuring interchangeability of such features as film and slide carriers, projector masks and lens mountings.

Visual indicator lamps for use in telephone and telegraph switchboards and for allied purposes. *B.S.* 1050:1953. *Price 2s. 6d. net.* For the first time are given, in this revised edition, figures for carbon filament lamps of the type covered, together with other amendments to certain ratings, particularly those of 6 V tungsten filament lamps. Elsewhere in the standard several definitions have been amended, and the method for batch sampling and testing simplified. Covering the range of both tungsten and carbon filament lamps now in general telecommunications use, the standard includes sections on selecting lamps for testing, and test conditions and rejection, and gives also figures for initial rating and life performance.

Radio-interference suppression for motor vehicles and internal combustion engines. *B.S.* 833: 1953. *Price 3s. net.* Interest in interference suppression for motor vehicles has been aroused recently by the publication of regulations to come into force this year and hence the publication of this revised edition of B.S. 833 is particularly opportune. The revision has been produced to incorporate present-day knowledge of the technique of suppression of interference from motor vehicles and internal combustion engines.

In this standard is specified the greatest permissible magnitude of electric fields producing interference in the frequency range 0·2 to 150 mc/s by such vehicles, engines and associated equipment. It is intended that this limit, which for 30 to 150 mc/s is identical with that given in the regulations, should be sufficient to protect radio services, including television, likely to be situated at normal distances from the interference source. It is not primarily intended to ensure interference-free reception on the vehicle or boat in which is situated the engine or accessory giving rise to the interference.

Ratings and other requirements for general components (resistors, inductors and capacitors) used in suppression equipment are also specified. Appendices describe briefly the origin, nature and magnitudes of radio interference and give main characteristics of a suitable measuring set.

British Standards reviewed above may be obtained at prices stated from the British Standards Institution, 24 Victoria Street, London, S.W.1.

The WEEK in NEWS

Exports are Primary Concern in 1953

Economic Survey reviews Past Experience and Future Prospects

CONCENTRATION on increasing exports and saving imports will continue to be an essential feature of economic policy in 1953, according to the Government's Economic Survey, issued last week. The driving force behind export expansion can come only from industry, but it is recognised that the Government has the duty of creating and maintaining conditions favourable to such expansion. In particular, costs and prices at home must be kept in line with those of competitors, and the re-equipment of industry and the maintenance of full efficiency must have close attention.

A considerable increase in home consumption of coal is required to support industrial production, and since it should be possible to find markets for larger exports, the need for increased production is clear. The outcome, however, is recognised as depending in the main on the success of the present N.C.B.-N.U.M. productivity drive.

Steel prospects for 1953 are good, with plans drawn-up for the production of 17·5m tons of crude steel, and current stocks of most raw materials are described as "fairly healthy." Exceptions are selenium and natural sulphur, although the effect of the latter shortage should be offset by the development of alternative methods of manufacturing sulphuric acid. Moreover, except in the case of aluminium, copper and nickel, raw material prices are lower than they were a year ago.

In the long-term outlook, it is considered that the prices of primary commodities may tend to rise over the next five or ten years.

On the whole, the Survey forecasts a rise in the general level of personal consumption above the early level of last year, partly as the result of the declining effects of the 1950 stocking-up of durable goods.

In addition to its review of future prospects, the Survey gives a detailed summary of the economic scene during 1952.

B.E.A. Headquarters in Trafalgar Square

TRAFALGAR BUILDINGS, on the corner of Northumberland Avenue and Whitehall, has become the new headquarters of the British Electricity Authority in London. Accordingly, the offices of the chairman and deputy chairman and their personal staffs have been transferred to that address from Winsley St. Others who have undertaken a similar move are the secretary and his deputy, together with the Finance, and Committee and General Administration branches of his department. Moving into Winsley St. are the Labour Relations and Welfare departments.

NEW IMPORT QUOTAS FOR URUGUAY

URUGUAY has announced the opening of further quotas for the import of U.K. goods of medium and less-essential categories, to the value of £1,410,000. Among the items included under these classifications are electrical goods, cookers, clocks, electrical domestic equipment, refrigerators and radio valves. Exporters are reminded that applications for import licences must be submitted by April 15. Similar quotas for essential goods were announced previously.

Price of Aluminium has been Reduced

PRICE of virgin aluminium in ingot form of a purity of 99% to 99.5%, has been reduced by £5 to £161 per long ton delivered consumers works, as from April 1. This was announced by the Ministry of Materials last week. There is to be no change in premiums which came into effect on July 1 for metal of higher purity and that in notch bar form. This price reduction is said to be due to improved rates of exchange.

The First Half-Century

From our correspondence column it will be seen that the Government has agreed to grant £3,000 in aid of the funds of the Engineering Standards Committee. The grant is for next year only, and must not be taken as a precedent. It would not be easy to over-estimate the importance of the work which the Government has officially approved by its noble grant of £3,000. Standardisation means much: it means reduced cost of production, increased output, interchangability of parts, ease of renewals and saving of time. Also, when trade is depressed the manufacturers can keep on producing for stock, knowing that when the busy time comes their products will be the right size. If we are the first nation to standardise thoroughly we ought to get back a lot of the foreign trade that we have lost.—*From our issue of April 9, 1903.*

Details of Machinery Trades Convention

FULL programme of the annual Convention of the Association of Electrical Machinery Trades, which is to take place at the Queen's Hotel, Eastbourne, between April 19 and 21, has been issued. There are to be two papers. The first on Monday afternoon by Mr. A. R. Henning, of Fibreglass Ltd., will be on "Application and Uses of Fibreglass: particularly Electrical." The second on "Appraisal and Application of Electrical Power Drives for Machine Tools." will be given by Mr. F. H. Schroeder, of Lancashire Dynamo and Crypto Ltd., on Tuesday morning.

Other events include the assembly and dinner on Sunday afternoon and evening; council meeting first thing on Monday morning; and the dinner and dance on Monday evening. Reservations may be made by application to the Association's secretary at 100 Park Street, Grosvenor Square, W.1.

Commercial Use for Electronic Computor

REFERENCE has been made in these columns to the installation of an electronic computor at Manchester University and the despatch of a similar computor to the University of Toronto last year. These machines were made by Ferranti, Ltd. whom we now hear, have had an order from the Royal Dutch Steel Group, which intends to use the machine at its research establishment in Amsterdam. This latest computor will cost about £100,000, and is to be used for the extensive calculations required in research in petroleum chemistry and engineering. It is a development of previous machines, one of which was exhibited at the Berlin Industrial Exhibition in 1951. which Dr. Adenauer, a mathematician, tried hard to baffle. Ferranti's Dutch order is particularly significant because this is believed to be the first order for an electronic digital computor for commercial use.

OFFICIAL PUBLICATIONS

ECONOMIC SURVEY FOR 1953. Command Paper No. 8800. (*See page* 695). H.M.S.O. 1s. 6d.

BRITISH STANDARDS. PD.1566. Amend. to BS.714: 1940, Cartridge Fuse Links for use in railway signalling: PD1569: Amend. to BS.229: 1946, Flameproof Enclosure of electrical apparatus: PD1574: Amend. to BS.1113: 1951, Water Tube Boilers and Superheaters: PD 1575: Amend. to BS.93: 1951, B.A. Screw Threads.

P.T. SCHEME FOR . . . OVERSEAS VISITORS

THE Purchase Tax Coupon Scheme for overseas visitors issued in June 1951, has now been reprinted by H.M. Customs and Excise Commissioners. Some minor changes have been made to remove doubts and difficulties, and the wording of the certificate has been modified. This scheme does not apply to such electrical commodities as space and water heating appliances, floor polishers and vacuum cleaners, refrigerators, radio and TV sets, and washing machines.

. . . AND U.S. FORCES

ARRANGEMENTS for relief from purchase tax on certain purchases made on behalf of U.S. forces in this country have been modified slightly. In future relief will be given directly by allowing tax-free delivery of the goods concerned. The new arrangements apply as from April 1.

An Electric Club for Tynesiders?

POSSIBLY one of the most flourishing clubs in the electrical industry is the Birmingham Electric Club, and others that have been formed on the basis of that body have also proved popular ventures. We heard last week that electrical engineers in the Tyneside area are contemplating the formation of such a club and circular letters have been dispatched calling attention to a meeting at The Turks Head Hotel, Newcastle, at 7 p.m. on April 16. Purpose of the meeting is to discover the support which the idea would receive. Instigators of the scheme are Mr. A. C. Bendall of Simplex Electric, Gateshead, and Mr. W. J. Johnson of J. A. Crabtree, Whitley Bay.

A Blinking Stunt

AT the Electrical Exhibition Venners' zebra crossing beacon flashed in synchronism with the coloured lights on Nettles' stand. On enquiry we discovered that Nettles borrowed a Venner zebra flasher and it was eventually decided to synchronise the two installations. The beacon was operated at 100 W while Nettle's flasher was loaded at over a kilowatt. Although some 500% overloaded, the flasher showed no signs of stress at the end of the show.

Electricity Board was 90% to Blame

DAMAGES of £10,049 with costs were awarded to the widow of a Divisional Fire Officer who was electrocuted while attending a fire at a factory in September 1950. The case came before Mr. Justice Barry at Manchester Assizes. The wife sued Mayoh and Co., Salford, occupiers of the factory, and the N. Western Electricity Board, and blame for the fatality was apportioned as 90% against the Electricity Board and 10% against the other defendants.

The facts of the case were that the fire officer satisfied himself the electricity supply was switched off, entered the building and shortly afterwards was found unconscious with a live wire in his hand. The switches which had been turned off, were not those controlling the main supply, and it was also found that two leads had become crossed and the neutral wire charged. The judge said that as the Electricity Board had carried out work on the premises recently, the occupiers could reasonably have assumed that the main supply was properly connected.

Warnings in Use of Electric Blankets

REFERRING to the recent local fatality which followed a fire caused by an electric blanket, the Burton Accident Prevention Council recently discussed and commented on the use of these appliances. They received a report from the town's Chief Fire Officer, who gave some facts of the dangers and causes of disasters. There were, he said, 643 cases of fires in electric blankets throughout the country during 1950. Of that total 216 blankets caught fire due to broken elements or short circuits.

Among other causes reported by fire authorities were 29 cases of failure of thermostats or safety fuses, 72 cases of overheating when no thermostat was fitted, 10 cases of faulty connections, 11 of faulty switches or plugs, and 15 of faulty cable or flex. The fire officer advised users to follow makers' instructions and have the appliance overhauled periodically. He also warned against allowing children or infirm persons using the blankets without supervision, and against leaving the appliance on too long even if fitted with safety devices.

Private Enterprise in the Air

PRINCIPAL speaker at the Batti-Wallahs monthly luncheon was Captain J. Summers, O.B.E., who chose as his theme the contribution made by private firms to the British aircraft industry. He emphasised his point by quoting personal experience during his long period as one of the leading test pilots. An interesting point that he made was that the bomber force of the future must of necessity be small because of the tremendous outlay in finance which was represented by the modern jet or turbo-prop machine—and he contrasted this cost with the money paid to the men who had to pilot the machines.

British Designs for Switzerland

COINCIDENTAL with the trade fair in Zurich in June some 1,000 exhibits of current British design are to be shown at the city's Industrial Art Museum. This follows a request from Switzerland seeking a large selective exhibition of British industrial design. We understand the principal selection of goods will be made from the Council of Industrial Design's "Design Review," and will represent, among other industries, lighting fittings, radio and television. Manufacturers who have products not yet accepted for "Design Review" are invited to submit photographs or flat samples. The display in Zurich is one of a series of national exhibitions which have been held during recent years. Enquiries to the British Council, 2-6 Bainbridge Street, W.C.1.

CHEAPER POWER WOULD HELP THE HIGHLANDS

A SUGGESTION was advanced in Inverness recently that if the N. of Scotland Hydro-Electric Board were to make their charges for electricity a lot cheaper than elsewhere it would be a great step towards attracting industry to the highlands. It would also curb the tendency towards depopulation, it was stated. The conclusion was reached at a meeting of the Local Authorities H.-E. General Committee, which was discussing the terms of a memorandum dealing with hydro-electric development and the benefits to be derived from it in relation to Highland rehabilitation.

The memorandum will eventually be sent to the Minister of State along with a request for an interview to discuss it. It was prepared by Gen. Sir James Gammell, chairman of the committee. Before being sent to the Minister it will be submitted to constituent local authorities.

Reward for Service

NEARLY 60 employees of the N. Western Division of B.E.A. have been presented with Long Service Awards—the first of a series of presentations taking place throughout the Division. The awards were valued at £20 for 35 years' service and £10 for 25 years' service. They were given to the employees by Mr. A. R. Cooper, Divisional Controller.

Ship Propulsion

Propeller motor for the new tanker "Helix," ready for transport from the British Thomson-Houston Co.'s Rugby works. Without air coolers, trunking, ventilating fans the motor still weighed 100 tons. The "Helix" is one of two tankers ordered by the Anglo-Saxon Petroleum Co., which, with two others being built in Holland, will have identical BTH machinery comprising the 8,300-s.h.p. turbo-electric propulsion equipment, 870 kW geared turbo - alternator/exciter sets, auxiliary motors, associated control gear and switchboards

Mushroom cold cathode units employed by the G.E.C. in Plymouth Co-operative Society's new department store

Special Fittings for Plymouth Store

A MONTH AGO we referred to a large lighting installation in Boots' new store at Swansea. That installation was a large one but one of comparable size has been carried out at the Co-operative Society's new Plymouth shop, claimed to be one of the largest department stores in the West country, and once again the fittings were supplied by the General Electric Co.

A number of different fittings and types of lamps have been used to suit particular situations. Main shop lighting has been provided by specially designed cold cathode pendant fittings with polystyrene louvres, and the "colour" of the lamp chosen to offset various displays to best advantage. The basement has been illuminated effectively by standard "mushroom" cold cathode units, while in the hairdressing salon both tungsten and fluorescent lamps have been employed. Nine fluorescent circles housed in special Chrysaline shades light the main area of the salon, while individual cubicles are illuminated by a Chrysaline ceiling fitting housing three 60 W tungsten lamps. Specially designed circular fittings recessed into the ceiling have been employed at entrances.

The store was planned by Mr. W. J. Reed, chief architect to C.W.S., with advice on engineering and electrical problems from the Society's chief engineer, Mr. A. E. Westlake.

Latest Designs Favoured

CONTEMPORARY designs of furniture are preferred to the traditional types, it has been disclosed following the exhibition and poll held last month at Charing Cross Underground Station by the Design and Industries Association. Two identical rooms were furnished at the same cost, one in contemporary style and the other in the way in which the trade has found to be most profitable. Well over 30,000 visitors voted and three in five persons favoured the first mentioned style. Electrical items included were lighting fittings and wireless sets.

Floodlights Save Lives of Birds

THE floodlighting of Dungeness lighthouse last autumn has apparently been a successful experiment in efforts to save the lives of migrating birds. The Royal Society for the Protection of Birds has been concerned at the heavy death roll among birds which crashed into lighthouses and lightships. With the co-operation of the S.E. Electricity Board, Dungeness lighthouse was illuminated with floodlamps so that birds could see to fly round. Two 1,000 W lamps were installed. Similar systems are now in use in Germany, Holland and Sweden.

LOCAL COUNCILS WANT SUPPLY INDUSTRY RETURNED TO THEM

HASTINGS town council's resolution that gas and electricity distribution should be returned to control of local authorities was carried when it came before the Association of Municipal Corporations at their annual meeting. It was said that nationalisation had come to stay but it was time selected municipal bodies replaced area boards with a view to reducing costs and gaining closer contact with the people. At present, the knowledge of many local authorities with pre-nationalisation experience was being wasted. Much of the expense involved in the present structure of the supply industry could be obviated by merging their duties with those already carried out by local council staffs. The speaker said he was convinced municipal organisations could do better than the area boards.

Warning not to Dabble with Installations

A REPORT of the Manchester district committee to the N. Western Electricity Consultative Council contained a warning concerning consumers who tend to dabble with electrical installations. People should be advised, it stated, to have work carried out either by the Electricity Board or by registered contractors.

It was also agreed at the Council's recent meeting that an extra two days' grace be allowed to consumers who were late in paying their electricity bills.

Oil Bay Workers' Rise

MEN who are employed in oil bays where the jointing of oil-filled cables is being carried out are to receive an additional allowance of 3s a day. This increase has been announced by the Joint Industrial Council for the Electrical Cablemaking Industry. It will continue while the men are employed in the oil bay until such time as the bay has been cleaned out.

British Engineer Speaks to American I.E.E.

AT a meeting of the Los Angeles division of American Institute of Electrical Engineers a short time ago, Mr. Floyd L. Goss, a member of the American Productivity Team which studied our supply industry last year, paid tribute to the high standard of British design and engineering. He spoke on "Electricity Supply Industry in Britain," and particularly of the formidable task of handling one large authority such as obtains in this country.

Present at the meeting was Mr. A. J. Nicholas of S. Wales Switchgear, Ltd., who, invited to speak after Mr. Goss, emphasised that the danger of large organisations was the engineer's responsibility to guard his prior claim to the high levels in the industry. The industry, he said, depended on the engineer who should develop other qualities of administration, and the like, to guide the industry.

NEWS IN BRIEF

A week's training course for foremen is being organised at Robert Hyde House, 49 Bryanston Sq., W.1, between April 20 and 24 by the Industrial Welfare Society.

Visitors to Milan between now and December may like to know that a Leonardo da Vinci Scientific and Technical Exhibition is being held at the National Museum of Science and Technics.

The new £232,000 submarine cable factory and depot of Cable and Wireless Ltd., in Singapore, begins production early this month, we understand.

Those taking part in the Lundberg "Miniac" switch competition on Simplex Electric's stand at the Electrical Engineers' Exhibition may like to know how their guess is faring. Latest score known is that the switch had completed 109,221 operations. The test is being continued at the company's Tottenham Court Rd. showrooms.

Training Course for Training Officers

INFORMATION has reached us of yet another residential study course being organised by the Institute of Personnel Management. This latest five-day course will be on Education and Training and will take place at Worcestershire Brine Baths Hotel, Droitwich Spa, between May 10 and 15. It is, in fact, a training course for training officers, aimed as a contribution to an organisation's training plan for its personnel staff. The programme will give education and personnel officers responsible for training an opportunity to study aspects of their work and to exchange experiences.

WIVES WELCOME

WIVES of members of the S. Wales Institute of Engineers will be allowed to make use of Institute's library in future. Main use is expected to be as a convenient rendezvous when visiting town.

Questions in Parliament . . .

Kafue Power Project

Mr. O. Lyttelton stated last week that he had not received the report of the Kafue scheme nor the Governor's comments. He assured Mr. Dodds-Parker that estimates of expenditure would be carefully examined.

Pontop Pike

No date could be given yet of the opening of Pontop Pike, Mr. Gammans stated. Test transmissions would be started as soon as possible. At present work was proceeding on the B.B.C. station and on Post Office connecting links.

Scottish Constructional Schemes

In a written answer, Mr. J. Stuart stated he was satisfied the N. of Scotland H.-E. Board was developing generating capacity and extending transmission and distribution schemes as quickly as possible. There were 13 constructional schemes in hand which will have a total installed capacity of 286,800 kW and average annual output of 827 million units. It was hoped to start on five more schemes this year and a further 11 schemes are under consideration. Sir W. Darling had asked whether work on the constructional schemes could be accelerated.

Fuel-Saving Equipment—Loans

Giving details of the Government loan scheme for fuel-saving equipment, in reply to Mr. Nabarro, Mr. G. Lloyd stated that to date three loans had been granted at a cost of £25,960. Thirty applications had been received, eight had been withdrawn and 11 rejected. The experimental scheme had still two months to run. He added that the Ridley Committee's recommendation to continue or extend the scheme was still under consideration.

Savings on Industrial Research

Manchester Joint Research Council's survey of the technical resources of industrial firms was complete and a report was being prepared for publication, said Mr. Molson in the House last week. He went on to say that the Dept. of Engineering Production at Birmingham University was continuing its survey under a contract with D.S.I.R., and results would probably be published in an appropriate scientific journal. A pilot survey of technical resources of industrial firms of two small selected areas was being carried out by the Social Survey. The D.S.I.R. was considering publication of a general paper on all three surveys. Mr. Molson said the fullest publicity was given to these surveys whenever possible.

Company Activities . . .

Associated Electrical Industries

In spite of a slight fall in sales for future delivery, orders received by the group in 1952 exceeded production, Sir George E. Bailey, the chairman, stated at the annual general meeting last week. Orders in hand now stand at £138 million with deliveries spread over four years. But the distribution of orders over all products has not been uniform. While orders for heavy plant for the supply industry have been well maintained, there has been a reduction on such items as motors and control gear, domestic appliances and lamps. During 1952 the companies in the group exported approximately one-third of their total output, in spite of curtailment of large projects and the cancellation of domestic appliance orders due to the import cuts imposed by the various Dominion Governments. Sir George also drew attention to the difficulties confronting manufacturers of capital equipment in negotiating long-term finance in connection with export orders, and while both banking and Government authorities were helping in the matter, he urged that more must be done. A constant and growing investment of British capital abroad is needed, he added.

Thomas Bolton and Sons

Are cable manufacturers and other large copper consumers allowing their stocks to run down in the hope that the price of copper will fall still further? To judge from the remarks of Mr. P. V. Hunter, chairman of this company, that may be the explanation for the sudden change of trading conditions of these well-known copper manufacturers since the closing months of 1952. He reports that the company ended the year with a smaller order book than they have had for a considerable time, due to a serious reduction in orders received. Some part of this may be due to a decrease in usage by customers; but in view of this uncertainty, he feels doubtful if 1953 can be as profitable for the company as last year.

Year to Dec. 31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	284,853	95,220	29	7½	—	—
1949	434,597	150,008	46	10	—	—
1950	334,157	53,055	10	10	29/6	28/9
1951	614,830	175,484	58	12½	29/6	27/6
1952	799,807	198,072	67	12½	28/4	27/3

British Aluminium Ltd.

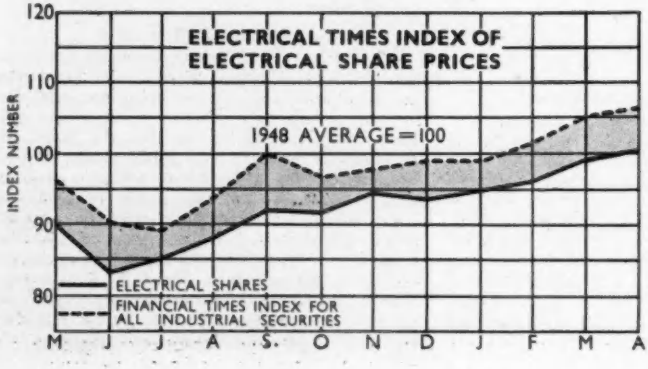
The results for 1952 show little change from those of the previous year, and with a final dividend of 6% the total distribution remains at 12%. The manufacturing and trading profit for 1952 is £2,460,991, which is about £88,000 lower than for 1951. The consolidated net profit after all charges, including taxation, amounts to £676,705, which again is a reduction of some £229,000 mainly due to a larger increase in taxation.

British Vacuum Cleaner and Engrg. Co.

The small reduction in the trading profit shown in our accompanying table is apparently due to the restriction in the trading activities of the Domestic Appliance Section of the company which took place during the year. But increased activity took place in other sections, the directors add. The balance sheet shows that the bank loan has increased to £500,000.

Year to Sep. 30	£ Trading Profit	£ Net Profit*	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	94,695	9,917	6	20	16/4	11/9
1949	115,056	35,850	40	20	13/6	7/-
1950	189,564	60,181	71	25	13/3	7/1
1951	284,964	87,480	105	25	19/6	8/9
1952	216,838	45,173	52	25	14/9	12/6

* Available for parent company.



This month is remarkable because it is the first since December 1951 the index for electrical share prices has topped the 1948 average. Actual figure of the Electrical Times index is 100·7, a rise of 2·36 over the preceding month. The Financial Times index for all industrial share prices rose from 105·3 to 106·03. Figures are based on the average prices prevailing during 1948

Metropolitan Electric Cable and Construction Co.

An increase in the net profit, after allowing an extra £70,000 for taxation, is the result of this company's operations in 1952. The directors have decided to increase the final dividend from 15% to 40%, making a total for the year of 50% (25%). The net profit for 1952 is £46,476.

Telegraph Condenser Co.

Good results for 1952 are reported. With a final dividend of 15% the total for the year is again 20%, but on capital increased by a 25% scrip issue. The trading profit for 1952 is £508,216 compared with £468,319 for the previous year. It is proposed to capitalise a further £50,000 of the undivided profits to be applied in paying up 100,000 new Ordinary 10s. shares.

Westinghouse Brake & Signal Co.

Resolutions increasing the authorised capital from £1 million to £2½ million, by the creation of one million new shares of £1 each, were approved at last week's meeting. Capt. A. R. S. Nutting, chairman, in his review of the company's activities during the year ended September 27 last (of which other details were given in our February 26 issue) stated that the company's total despatched sales during the year were a record, and orders on hand at the present time remain at a high figure.

Dividends Declared

Albright and Wilson.—Final dividend of 10% making 15% (*both same*). Group profit, after all charges excluding tax is £1,527,341 (*£2,346,418*).

British Electric Resistance Co.—Interim of 5% (*same*).

Parmiter, Hope and Sugden.—Interim of 7½% (*same*).

A. Reyrolle and Co.—Final of 7½% making 12½%. Profit is £2,650,208 (*£2,071,898*).

J. and F. Stone Lighting and Radio.—Interim of 10% (*same*).

Electric Supply News . . .

Great Yarmouth

The Council's Town Planning Committee has now received a further report from the B.E.A. concerning proposals to deal with grit and fume emission from the new generating station. The committee considers that the authority's assurances are satisfactory. The B.E.A. has stated that it is proposed to install two types of equipment, cyclone coupled to electrostatic plant, operating in series.

Kendal

The Lake District Planning Board, at its meeting last week, decided to press for provision of an electricity supply for Borrowdale and Langdale. Col. R. Morton, of Keswick, maintained that the Board had not only a responsibility to protect the natural beauty of the area but also a duty to encourage and improve the amenities of life of those people living in the National Park. Borrowdale had 130 houses, including five hotels, three hostels, 20 farms and a slate quarry, while thousands of visitors and tourists stayed in the valley every year.

For 16 years efforts had been made to obtain a power supply, but economy grounds had been advanced as the reason for not doing the work. He thought the probable cost of £30,000 was not high when compared with the needs and benefits.

N. Ireland

The Electricity Act (Amendment) Bill has been given an unopposed second reading in the Ulster House of Commons. This provides for a return to the position enabling the Electricity Board for Northern Ireland to require a five-year guarantee of revenue against power supplies or, alternatively, of requiring contributions towards the capital cost of distribution extensions involved in giving a supply. Moving the second reading, Mr. W. V. M'Cleery, Minister of Commerce, pointed out that since the passing of the 1948 Act, the Board had carried out rural electrification works to a value of nearly £1,750,000 in the first three years. They had, in addition, by the end of 1951, approved schemes for further development costing nearly £1,500,000. Unfortunately, the hopes of increased consumption and revenue were not being realised. In very many instances the returns from new consumers fell very far short of what was needed to cover the cost of providing the supply, he said. It then became apparent that there was a limit to the rate at which the Board could afford to expend capital on unprofitable investment, even in rural electrification, he added.

LIGHTING SCHEMES

Brigg.—R.D.C. has received requests for the erection of 151 additional street lamps in the area, and the Yorkshire Electricity Board is being approached on the matter.

Ellesmere Port.—The Council is seeking M.o.T. permission to continue the sodium lighting on the main road from Childer Thornton to Hooton cross-roads.

Heywood.—The M.o.T. has informed the Council that it is unable to approve a loan to enable the latter to continue converting gas lamps to electricity in the side streets.

Omagh.—The U.D.C. is considering a proposal to convert street lighting to electricity.

Stoke Newington.—The Highways and Town Planning Committee has been informed by the M.o.T. that their original scheme for conversion from gas to electricity of street lighting must be revised. Accordingly the committee is submitting a revised scheme to include the Brownswood Park area and Mountgrove Road, estimated to cost £3,500.

Commercial Information

CONTRACTS OPEN

HOME

April 10.—Lancashire. Electrical installation and supply of kitchen equipment to Longridge Woodville special school. Applications by above date. County Architect, County Hall, Preston.

April 11.—Swansea T.C. Contractors wishing to tender for electrical installation at Penlan Multilateral school should apply to Borough Architect, The Guildhall, by above date. Deposit £2. (See March 26 issue.)

April 13.—Northampton T.C. Installation of street lighting comprising 69 columns with fluorescent lamps, and 54 with tungsten mercury lamps. Borough Engineer, Guildhall. Deposit £2 2s. (See March 26 issue.)

April 13.—Portadown (N.I.). Electrical installation in new classrooms and alterations to existing installation at Portadown College. J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast. Deposit £3 3s.

April 13.—Wisbech (Camb) T.C. Installation of electric wiring in houses on New Drone and Elm Rd. estates. Borough Engineer, Town Hall.

April 14.—Bilston T.C. Supply and erection on various roads of about 56 250W H.P. mercury discharge lamps on 25 ft concrete columns, 29 80W H.P. fluorescent mercury discharge lamps on 15 ft concrete columns, and five 100W metal filament lamps on 15 ft concrete columns. Borough Engineer, 20 Wellington Rd. Deposit £3 3s.

April 14.—Bury T.C. Electrical installation for lighting, power, etc., at Walmersley primary school. Borough Engineer, Town Hall.

April 14.—Islington B.C. Installation of fluorescent lighting, wiring, etc., in Essex Rd. library. Borough Engineer and Surveyor, Town Hall, Upper St., N.1. (See March 5 issue.)

April 14.—Radcliffe T.C. Installation of sodium lighting along five roads involving supply, erection and wiring of 90 concrete columns with lanterns and accessories to class A standard. Engineer and Surveyor, Town Hall.

April 15.—Liverpool. Electrical and heating installations at Park Hospital, Newsham Park. Regional Engineer, M. N. Cooke, 2 Union St., Old Hall St., Liverpool. Deposit £2 2s.

April 16.—Northern Ireland. Electrical installation in new nurses' home at N.I. Fever Hospital at Purdysburn. F. W. Parkinson and Partners, consulting engineers, 6 Murray St., Belfast. Deposit £3 3s.

April 16.—Port Talbot T.C. Electrical installation to about 500 houses in the borough. Borough Engineer and Surveyor, Municipal Buildings.

April 17.—Edinburgh. Electrical installation in 28 houses in Restalrig Ave., and 12 in Fillyside Gdns. City Architect, City Chambers.

April 20. — Ashton-under-Lyne T.C. Complete electric wiring in 26 houses at Gambrel Grove. A. T. Kemp, Municipal Offices. Deposit 10s.

April 20.—Lancaster. Supply and installation in Riverside pumping station of two electrically driven centrifugal pumps to deal with 6,400 galls. of sewage per min. City Engineer, Town Hall. Deposit £2.

April 21.—Huddersfield. Electrical installation in Rawthorpe secondary school. Borough Architect and Planning Officer, High St., Buildings. Deposit £2 2s.

April 24.—Belfast. Supply and erection of drainage pumping equipment including 600 g.p.m. pumps, motors, pipes, valves, lighting tackle, etc., for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Feb. 26 issue.)

April 24.—Manchester. Electrical installation in Openshaw College of Further Education in Whitworth St. City Architect, Town Hall. Deposit £1 1s. (See March 12 issue.)

April 24.—Oswestry R.D.C. Installation of electricity in 33 houses and part installation in 26 houses at Morda, Llanymynech and Ruyton-XI-Towns. C. H. W. Pugh, clerk, Council Offices, Castle View. Deposit £2 2s.

April 25.—Walton and Weybridge U.D.C. Supply and erection of four non-chokeable sewage pumps with electric motors, etc., for Weylands sewage disposal works. Engineer and Surveyor, Council Offices, Walton-on-Thames.

April 27.—Chatham (Kent). The Rochester, Chatham and Gillingham Sewerage Board require supply and installation of lighting and power cables, lamp standards, lighting fittings, junction boxes and ancillary equipment at Motney Hill Sewage Works, Rainham. Documents from consulting engineers, W. H. Radford and Son, Albion Chambers, Kent St., Nottingham. (See March 26 issue.)

April 27.—Skelton and Brotton U.D.C. Wiring and installation of fittings in 34 houses on Brotton and Boosbeck estates. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (Advertised in this issue.)

May 4. — Newcastle-on-Tyne. Electrical installation at new Rutherford College of Technology. City Architect (Educ. Section), 18 Cloth Market. Deposit £1 1s.

No date stated.—N. of Scotland H.-E. Board. Erection of high and low voltage distribution lines at Aberlemno, Angus. Engineers, Kennedy and Donkin, Alliance House, 12 Caxton St., London S.W.1. (Advertised in this issue).

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

April 22.—South Africa. S. African Railways are inviting tenders for supply of 100 concentrating type industrial lighting fittings for use with 1,000W incandescent lamps and 100 same for 400W. H.P. mercury vapour lamps. B.o.T. (Ref: CRE 11608/53)*.

April 29.—Australia. Supply of 500 kVA transformer for Mackay City Council. It shall be suitable for outdoor service and connected to o.h. lines utilising insulators of rating number corresponding to service voltage. State Electricity Commission of Queensland, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref: CRE 11343/53)*.

April 29.—Australia. State Electricity Commission of Queensland invites tenders Specification No. 376 for manufacture, supply etc., of 660 V power cables (about 700 yd) and cable boxes (14). B.o.T. (Ref.: CRE 11,308/53)*.

May 6.—U.S.A. Design, manufacture, supply, etc., of six 100,000 h.p. hydraulic turbines and appurtenances, and furnishing services of erecting engineers and master mechanic for Chief Joseph Dam. Each turbine complete with spiral case, spiral case extension, draft tube liner, pit liner and appurtenant parts. Corps of Engineers, U.S. Army Office of District Engineer, Seattle District, 4735, East Marginal Way, Seattle 4, Washington. B.o.T. (Ref: CRE 11490/53)*.

May 19—New Zealand. Min. of Works, Wellington, invites tenders (Contract No. H.D. 159) for supply of hydraulic and electrical components for control systems for diversion sluice gates at Roxburgh scheme.

June 23.—New Zealand. Supply of two 30,000 kVA, 110/33 kV transformer banks and spare units for Henderson and Albany substations (contract No. 221). Secretary, Tenders Committee, State Hydro-Electric Dept., Wellington.

TRADE NOTES

New Branch. The Craigpark Electric Cable Co. Ltd., have opened a new branch at 75 Hanover St., Edinburgh 2. Telephone: Edinburgh 31403.

Argentine Lamp Imports. The Argentine Central Bank is to accept requests until April 20 for imports at official exchange rates of materials for the manufacture of incandescent and fluorescent lamps from Britain and certain other countries.

Change of Address. The Leeds office of the Riley Stoker Co. is now at National Employers' House, Quebec St., Leeds 1.

CONTRACTS PLACED

B.E.A. Condensing and feed heating plant for one 60,000 kW turbo-generator set at Marchwood, Hick, Hargreaves and Co., Ltd.; and circulating water pumps at same, Drysdale and Co., Ltd.; high pressure pipework at Portsmouth, C. A. Parsons and Co., Ltd.; coal handling plant at Castle Donington, Babcock and Wilcox, Ltd.; high pressure steam and feed pipework at Drakelow, Burton-on-Trent, Aiton and Co., Ltd.; alterations to circulating water system at Spondon, Holloway Bros., Ltd.; coal handling plant at Hams Hall C, Mitchell Engineering, Ltd.; high pressure piping equipment at Meaford, Babcock and Wilcox, Ltd.; two 1,220 kW Diesel alternator sets at Haverfordwest, Crossley Bros., Ltd.; two 300,000 lb/hr boilers at Bold, Yarrow and Co., Ltd.; and 33kV and lower voltage cable and accessories at same, British Insulated Callender's Cables, Ltd.; 132 kV 2,500 MVA switchgear at Keadby, A. Reyrolle and Co., Ltd.; three 550,000 lb/hr boilers at Wakefield, Foster Wheeler, Ltd.; two generator transformers at same, English Electric Co., Ltd. and also coal handling plant, Robert Dempster and Sons, Ltd.; four 360,000 lb/hr boilers at Chadderton, Simon-Carves, Ltd.; two cooling towers and circulating water culverts at Fleetwood, Fred Mitchell and Son, Ltd.; 7,500 MVA 275 kV switchgear at Iver substation, A. Reyrolle and Co., Ltd.; 132 kV overhead line at Kirkby substation, Riley and Neate, Ltd.; 132 kV overhead line at Carrington substation, Riley and Neate, Ltd.; and 132 kV overhead line from Castle Donington to Nottingham and Coventry, Riley and Neate, Ltd.

Luton T.C. Street lighting along Lea and Crawley Rds., N. Midlands Engineering Co., Ltd., £1,011.

Tynemouth T.C. Supply of electricity in second stage of Wansbeck pumping station scheme, N.E. Electricity Board, £1,434.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Miniac. 714,783. Class 9. Electric switches. Simplex Electric Co. Ltd., Broadwell Road, Oldbury, Birmingham.

Rubicon. 712,794. Class 11. Heating elements and immersion heaters. Controlled Heating Units (London) Ltd., Avenue Rd,. Hampton, Middx.

Saxauto. Electric cables, insulated wire, fuse wire, resistance wire. Saxonia Electrical Wire Co. Ltd., Roan Works, Roan St., Greenwich, S.E.10.

Your Queries — Answered

Spotlight for the location of overhead line faults, to be controlled from within the vehicle, etc., makers of? J.P.—London Electric Firm, New Works, Brighton Rd., South Croydon. (25429)

"Nippy" table cookers, makers of? D.L.—Beanwy Electric, Ltd., Tyseley, Birmingham. (25437)

"Autostic" fireproof adhesive, supplier of? S.B.—H. Brown 15 Lower Queen St., Sutton Coldfield. (25445)

Electrically heated guillotine for cutting nylon, makers of? B.C.—Theco Electrical Appliances, Ltd., 33 Theobalds Rd., W.C.1. (25458)

Russell Hobbs coffee percolators, makers of? D.E.—Russell Hobbs, Ltd., 1 Bensham Lane, West Croydon. (25464)

Twelve-way connector block encased in rubber, makers of? W.P.—We know of the p.v.c. product made by Belling and Lee, Ltd., Cambridge Arterial Rd., Enfield, but we have as yet to find a firm making connector blocks in rubber. (25471)

"Kobler" shavers, suppliers of? T.E.—G. Ettinger, Ltd., 8 Vigo St., London W.1. (25477)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Trade Marks (contd.)

Ultraphil. 711,834. **Infraphil.** 711,835. Class 10. Ultra-violet and infra-red ray apparatus. Philips Electrical Ltd., Century House, Shaftesbury Avenue, W.C.2.

Unitel. In design 709,528. Class 9. Television and radio receiving and transmitting instruments. Nagard Ltd., 63/64 New Broad St., E.C.2.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	280 0 0	—
LEAD, good soft pig (foreign)... ...	85½-86½	108 0 0
TIN (99·99·75%) ... ...(Cash)	830-835	—
,, (3 months)	805-810	—
ALUMINIUM, commercial purity (del.)	161 0 0	—
ZINC	74-74½	88 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	51 10 0	—
Mild Steel Tape (0·04 in.) ...	40 0 0	—

MEETINGS TO NOTE

THURSDAY, APRIL 9

E.P.E.A. (Mersey Tech. Group).—"Power Station Lubrication." G. H. Clark. Elect. Showroom, Whitechapel, Liverpool, 7 p.m.

I.E.S. (Nottingham Centre).—Presidential address by W. J. Wellwood Ferguson. E. Midlands Board, Smithy Row, 6 p.m.

I.E.E. (London).—"Special Effects for TV Studio Productions." A. M. Spooner and T. Worswick. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (S. Midland Centre).—"Devising of Examination Questions." Prof. G. W. Carter. College of Technology, Birmingham, 7 p.m.

FRIDAY, APRIL 10

I.E.S. (Huddersfield Group).—Annual meeting at Elect. Showroom, Market St., 7.15 p.m.

A.S.E.E. (Crewe Branch).—"Welding." W. Barnett. Royal Hotel, Nantwich Rd., 7.30 p.m.

MONDAY, APRIL 13

LEICESTER ELECTRICAL SOC.—"Electrical Equipment for Collieries." P. H. Harvey. Elect. Offices, Charles St., 7 p.m.

I.E.S. (Sheffield Centre).—"Horticultural Applications of Light." A. E. Cantham. Annual meeting. University, Western Bank, 6.30 p.m.

I.E.E. (London Radio Section).—Discussion on "Relative Merits of Broad-Band Transmission by Beam, Cable and Waveguide." E. C. H. Organ. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Mersey and N. Wales Centre).—Annual meeting at Liverpool Royal Instn., Colquitt St., 6.30 p.m.

I.E.E. (N.E. Centre).—Annual meeting and Conversazione at Station Hotel, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilisation Group).—"Characteristics and Control of Rectifier-Motor Variable-Speed Drives." P. Bingley. Imperial Hotel, Birmingham, 6 p.m.

TUESDAY, APRIL 14

I.E.S. (London).—"Sports Lighting." M. W. Peirce. 2 Savoy Hill, W.C.2, 6 p.m.

INCORP. PLANT ENGRS. (London).—"Maintenance of Process Plants." G. C. Allfrey. Royal Soc. of Arts, John Adam St., W.C.2, 7 p.m.

INCORP. PLANT ENGRS. (E. Lancs).—"Vibration in Buildings and Structures." Mr. De Bass. Engineers Club, Albert Sq., Manchester, 7.15 p.m.

I.E.E. (London Measurements Section).—"Digital Computors at Manchester University." T. Kilburn, G. C. Tootill, D. B. G. Edwards, and B. W. Pollard; "Construction and Operation of Manchester University Computors," B. W. Pollard and K. Lonsdale; "Universal High Speed Digital Computors—Decimal Storage System," T. Kilburn and G. Ord; "Cathode Ray Tube Storage," Prof. F. C. Williams, T. Kilburn, G. N. W. Litting, D. B. G. Edwards and G. R. Hoffman. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (E. Midland Centre).—"First Stage of Electrification of Estrada de Ferro Santos a Jundian (late Sas Paulo Railway)." R. J. B. Chatterton and D. H. Rooney. Elect. Showrooms, Derby, 6.30 p.m.

I.E.E. (N. Midland Utilisation Group) "Inherent Current, Voltage and Speed Control in Dynamo-Electric Machinery." J. C. Macfarlane, J. W. Macfarlane and W. I. Macfarlane. Elect. Offices, 1 Whitehall Rd., Leeds, 6.30 p.m.

I.E.E. (N.W. Centre).—"London-Birmingham TV Cable System." T. Kilvington, F. J. M. Laver and H. Stanesby. Engineers Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Logical Approach to Problems of Electric Space Warming." D. H. Parry. Presbyterian Hotel, Howard St., Belfast, 6.15 p.m.

NEWPORT ELECTRIC CLUB.—"Underwater Telephone Links." G. F. Lawrence. Tredegar Arms Hotel, 7 p.m.

WEDNESDAY, APRIL 15

I.E.S. (N. Lancs Group).—Annual meeting at 49a Fishersgate, Preston, 7.15 p.m.

INSTN. OF EXEC. ENGRS. AND OFFICERS.—"Inter-dependence of Administrative, Executive and Technical Staff." Dr. Walter Pinner. Imperial Hotel, Birmingham, 7.30 p.m.

INCORP. PLANT ENGRS. (Western Branch).—"Generation of Industrial Power from Process Steam." E. G. Ritchie. Grand Hotel, Bristol, 7.15 p.m.

I.E.E. (Sheffield Sub-centre).—Annual meeting. "Economic Basis of Battery-Electric Road-Vehicle Operator and Manufacture." H. W. Heyman; "Electrical Equipment of Battery Road Vehicles," W. D. Sheers. Grand Hotel, 6.30 p.m.

I.E.E. (Southern Centre).—Discussion on "Economies in Wiring Practice." Forbes Jackson, P. McKeerney and A. V. Milton. Annual meeting. 46 Commercial Rd., Portsmouth, 6.30 p.m.

I.E.E. (S. Western Sub-centre).—"275 kV Developments on British Grid System." D. P. Sayers; J. S. Forrest and F. J. Lane. Electric Hall, Torquay, 3 p.m.

A.S.E.E. (Manchester).—"Welding Transformers." G. C. Poxon. Engrs. Club, Albert Sq., 7.30 p.m.

THURSDAY, APRIL 16

INCORP. PLANT ENGRS. (Blackburn).—"An Approach to Maintenance." M. Brookes. Chamber of Commerce, Richmond Terrace, 7.30 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (London).—"Panel Heating." H. H. Bruce. Instn. of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Liverpool).—"Refrigeration—especially Air Conditioning." F. L. Pettman. Radiant House Bold St., 6.30 p.m.

I.E.E. (London Utilisation Section).—"Automatic Winding in Mine Shafts." B. L. Metcalfe and G. Cuttle. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (Irish Branch).—Annual conversazione and dance at Metropole Ballroom, Dublin, 9 p.m.

FRIDAY, APRIL 17

I.E.S. (Birmingham Centre).—"Discharge Lamps for Particular Purposes." E. H. Nelson. Regent House, St. Philip's Place, Colmore Row, 6 p.m.

I.E.E. (Sheffield Sub-centre).—Dinner and dance at Royal Victoria Hotel.

I.E.E. (N. Ireland Centre).—Annual Conversazione at Grand Central Hotel, Belfast, 8.30 p.m.

A.S.E.E. (S.E. London).—"Jet Engines." Ellham Congregational Church Hall, 8 p.m.

EXHIBITION DIARY

Physical Society. 37th Show at Imperial College, S. Kensington. Opens on April 13 and closes on April 17.

Radio Components. To be held at Grosvenor House, London, between April 14 and 16.

B.I.F. at Earls Court, Olympia and Castle Bromwich, opens on April 27 and closes on May 8.

BUSINESS PROSPECTS

HOME

Barnstaple R.D.C. Plans in hand for erection of three-storey blocks of flats at Braunton.

Bedlington U.D.C. Erection of further 200 houses is being planned.

Chester. Alterations and improvements approved at Heath Lane hospital at cost of about £12,113.

Chichester. British Railways propose to reconstruct Chichester railway station. Work expected to start early next year.

Coventry. Scheme suggested for erection of civic theatre in Corporation St. Shops and maisonnettes included. Estimated cost £180,050.

Darlington. Scheme in hand for first instalment of new College of Further Education.

Doncaster T.C. Plans to be submitted to Ministry for College of Further Education at estimated cost of £750,000.

Dukinfield T.C. Erection of 30 old people's homes in Lodge Lane. Architects are Cruickshank and Seward, 16 Princess St., Manchester.

Easington (Dur) R.D.C. Plans approved for 152 houses on Chapel Hill, for Peterlee Development Corporation.

Gateshead. North-Eastern Trading Estates Ltd. are considering extension or building of new factories for about 30 firms. Work expected to cost £1,200,000.

Gosport T.C. Tenders may be invited shortly for erection of 134 houses on Rowner estate.

Hamilton. Dean of Guild Court has approved plans for erection of 108 dwellings in Almade St. for Scottish Special Housing Association.

Linwood, Paisley. It is proposed to build 84 houses in Bridge of Weir Road.

London. Large school building programme for 1954-55 has been approved. It includes six primary schools, eleven secondary schools; and a reserve list of ten other schools.

Middlesbrough T.C. Erection of 80 houses at Park End. Borough Engineer, Municipal Buildings. Also a £30,000 scheme is under consideration for improving heating and electric lighting at Town Hall and Municipal Buildings.

Midhurst (Sus) R.D.C. 82 houses to be built at Linchmere Ridge.

Newcastle-on-Tyne. First stage of converting premises in Clayton Rd. East into school of art and industrial design will cost about £6,500.

Norwich. Primary school on West Earlham estate and infants school in North Park Ave. are in hand.

Perth T.C. Application to be made for sanction to borrow £97,425 for erection of 76 houses in Letham scheme.

Ringwood and Fordingbridge (Hants) R.D.C. Tenders to be invited soon for erection of 26 houses; and scheme is in hand for 54 dwellings in Whitsbury Road.

Romford T.C. Layout plans completed for 78 houses in Lodge Lane and 22 in Horndon Road.

Rotherham. Final plans approved for new £39,205 infants' block at Herringthorpe primary school. Also, T.C. is planning erection of another 250 houses on Kimberworth Park estate.

Sheerness U.D.C. Erection of 24 houses at West Minster. K. Scott, Engineer and Surveyor, Council Offices.

Sheffield. Construction of total of 56 dwellings on Hemper Lane estate. J. L. Womersley, City Architect, Town Hall.

Spenborough U.D.C. Approval given to plans for construction of 44 bungalows on Windy Bank estate, 12 on Whitechapel Grove estate and 14 at Gomersal.

Twickenham (Middx) T.C. 170 houses to be built between Uxbridge Rd. and Longford River.

OVERSEAS

Canada. Agencies for electronic and electrical equipment, electrical fixtures, air conditioning and ventilating apparatus required by Black and McDonald, 200 King St. West, Toronto.

Ecuador. Compania Anonima Balda Industrial Mercantil, Apartado 4828, Manta, wish to import on own account and/or obtain agencies of U.K. manufacturers of electric plants driven by diesel and petrol engines from 500 to 5,000 W capacity, and domestic electrically driven water pumps.

Guatemala. Catalogues and other descriptive literature of U.K. made electric motors of 1, 1½ and 2 h.p., and generating plants of 1, 2 and 3 kW (110 V 60 c/s single-phase a.c.) sought by Comercial Macdonald (Guatemala) S.A.

Lebanon. Badaoui and Solh, Imm. Azarieh, Rue de Syrie, Beirut, are interested in representing U.K. manufacturers of (among other things) electric generating sets.

U.S.A. C. and H. Air Conditioning Fan Co. Inc., 1591-1623 Dekall Ave., N.E. Atlanta 6, Georgia, wish to purchase electric motors to various specifications. The firm uses nearly 100,000 motors each year.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

H. C. Hiscock Ltd., 55 Old Church St., Chelsea, S.W.3. Electrical engineers and contractors, etc. Cap.: £5,000. Dir.: H. C. Hiscock.

Hughlock Hindle Ltd., 63 Union St., Chorley, Lancs. Motor, tractor, agricultural and electrical engineers and general electrical installation contractors, etc. Cap.: £30,000. Dirs.: J. B. Hindle, J. R. Hughlock, Mrs. E. R. Hughlock, H. Hindle and H. B. Hindle.

C. and E. Knight Ltd., 3/4 Clements Inn, W.C.2. Mechanical, electrical and general engineers, etc. Cap.: £3,000. Dirs.: C. E. Knight and Edna M. Knight.

Percy Lord and Son Ltd. To take over business of electrical contractor carried on at 1 Leicester Rd., Countesthorpe, Leics, by Percy Lord. Cap.: £2,000. Dirs.: P. Lord and M. Lord.

N. Pinnes Ltd., 36 Hillcourt Av., N. 12. Electrical engineers and contractors, radio and television engineers, etc. Cap.: £1,000. Dirs.: N. Pinnes and Betty Pinnes.

Sussex Refrigeration Supply Co. Ltd., 66 Goring Rd., West Worthing, Sussex. Cap.: £3,000. Dirs.: E. C. Pounsett, R. E. Turner and W. T. Wilson.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Stamford Industries (Gt. Britain) Ltd. T. A. Moodie, 203 Regent St., W.1. has been appointed liquidator, and creditors are asked to send particulars to him by April 10. Also a general meeting will be held at that address on April 27 to receive liquidator's report.

Partnerships Dissolved

Graham Hill and Poole. Partnership between Alexander Graham, Geoffrey E. Hill and Basil E. Poole, trading as electrical engineers at Priory Chambers, Priory St., and New Rd. Works, Netherton, Dudley, dissolved as from Feb. 28. Business will be continued by A. Graham and G. E. Hill.

Oldham and Boothman, radio and electrical engineers at Fleetwood and Preesall with Hackinsall. Partnership between James Boothman and George C. Oldham dissolved as from March 27. Debts received and paid by J. Boothman who will continue business.

BANKRUPTCY ACTS

Intended Dividends

Canterbury. John H. Coupland, trading as E. J. Ratcliff, electrical engineer, at 85 Northgate, Canterbury. Last day for receiving proofs, April 15. Trustee is A. M. Lauder, 1 The Parade, Canterbury.

ASSOCIATED ELECTRICAL INDUSTRIES

Steady Progress

THE 53rd annual general meeting of Associated Electrical Industries, Limited, was held on March 31 in London.

Sir George E. Bailey, C.B.E., M.Sc., M.I.Mech.E., M.I.E.E., the chairman, in the course of his speech, said: The year 1952 was one of steady progress for your company. Production was at a higher rate than ever before; shipments invoiced reached the record figure of £76,000,000. The comparable figure for 1951 was £63,000,000.

There has been no significant change in the number of persons employed and the increased output is, therefore, largely due to the wise expenditure in the last few years on new factories and additional and improved plant and machinery. Full benefit could not have been obtained from the increased productive capacity without the active co-operation of all our employees. This we have had in full measure.

Profit before tax has increased by nearly £2,000,000 to £9,900,000 but after tax shareholders are left with only £178,000 of the £2,000,000. Last year I mentioned that the Board's conservative dividend policy was due to the calls made on the company's financial resources by the heavy burden of taxation, the high cost of capital replacements, the increase in value of work in progress and the necessity of providing the extensions required to meet the ever-expanding demand for our products. These conditions will still apply today and the Board, therefore, regrets that it is unable to recommend an increase in the rate of dividend. It should be borne in mind, however, that the additional capital which the ordinary stockholders subscribed on bonus terms in February, 1952, ranked for a full year's dividend and accordingly the total ordinary dividend for 1952 amounted to £931,000 as compared with £673,000 for the previous year.

Expanding Demand

There is no doubt that the demand for electricity must continue to expand; as I mentioned last year, the consumption of electricity per head of population in this country is still only about half the corresponding figure in the United States. There is every indication that we are entering a period when conditions will again be highly competitive.

During the years of inflation success has depended very largely on maintaining production in the face of shortages of all kinds. Often more expensive materials and methods of manufacture have had to be adopted to overcome them. As the material supply position improves, costs are again of prime importance and our future prosperity will depend on our being able to manufacture at least as cheaply as our competitors at home and abroad. We have every confidence that our design and manufacturing staffs will be equal to the tasks which confront them.

As the sellers market gives way to a buyers' market we have every confidence in the ability of our commercial organisations throughout the world to obtain the necessary supply of orders for many and varied products to maintain employment in our numerous factories.

Our factories have been modernised and expanded and we have a highly efficient organisation. We are, therefore, in a strong position to face the challenge of the future.

The report was adopted.

INTERNATIONAL COMBUSTION (HOLDINGS)

Results Again a Record

THE nineteenth ordinary general meeting of International Combustion (Holdings), Ltd., was held on April 2 in London.

The following is an extract from the circulated Review of the chairman, Mr. G. R. T. Taylor:—

The gross profit of the Group is again a record, being £1,580,403 for the year as compared with £1,262,338. Taxation has, however, become a very heavy burden. At a time in the country's history when incentive is a vital necessity the ultimate effect of this penal factor is to stifle enterprise and initiative in every direction.

An interim dividend of 10% on the Ordinary stock in issue on July 31, 1952, having been paid, your directors recommend a final dividend of 10% on the Ordinary stock capital as increased in December last from £959,245 to £1,918,480.

With our present Order Book and the necessity for meeting the increasing universal demand for electrical power, I can see no immediate recession in our business, subject, of course, to world happenings which are beyond our control.

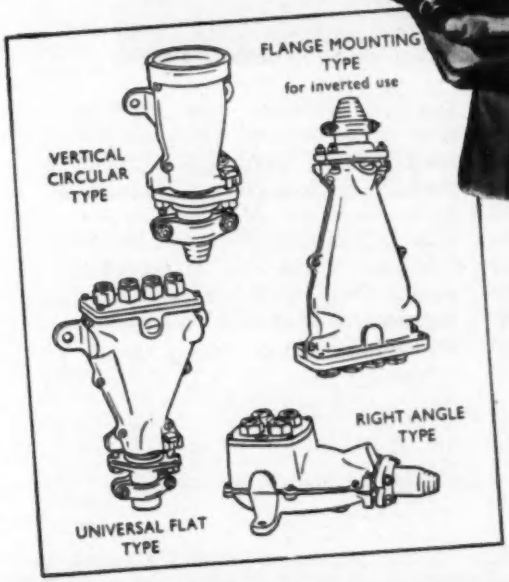
The Group has successfully overcome the difficulties in connection with obtaining raw materials and other supplies, with the result that the output is again much higher than previously and constitutes yet another record.

Our Associated Companies in South Africa, Australia and India continue to make excellent progress. During the past year we have registered a Company in Pakistan to facilitate trading there.

The report was adopted.

This *one* box-

can be used with twin or 3-core or 4-core cable. You need only stock very few sizes and types of boxes in order to meet the majority of your requirements for 660 volt indoor installations. Henley Catalogue 35 shows which boxes to order.



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INDOOR

TERMINAL BOXES

660 volts

Please ask for Catalogue 35

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

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WITH EVERSHED RECORDERS

Power Factor Recorders

In order to lower the cost per kilowatt of station capacity, power companies throughout the world, such as the Athens Piraeus Electric Co., Ltd., have installed Evershed recorders as illustrated. These instruments keep a permanent, 24 hour a day check on the power factor and enable the company to ascertain if any overloading is due to low power factor.

Evershed recorders have a wide range of application. There are instruments for measuring electrical quantities such as current, pressure, power, frequency. Mechanical quantities such as water levels, gas holder stock and speed can be recorded equally well. Single or multi-pen, switchboards or portable instruments available.

Please write to us for Publication J 222

EVERSHED PERMANENT CHART RECORDS FOR INDUSTRY

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6/46

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

HIGH- AND LOW-VOLTAGE DISTRIBUTION LINES

Aberlemno, Angus

TENDERS are invited for the erection of the above lines. Copies of the tender documents may be obtained on application, with cheque for £2/2/- (returnable), to the engineers, Messrs. Kennedy and Donkin, Alliance House, 12 Caxton Street, London S.W.1.

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace,
Edinburgh 3. (D 370)

SKELTON & BROTTON URBAN DISTRICT COUNCIL

TENDERS FOR ELECTRICAL WIRING, ETC.

THE COUNCIL invite tenders for the electrical wiring and installation of electrical fittings in respect of 18 houses on their Brotton Estate and 16 houses on their Boosbeck Estate.

Plans may be inspected and specifications and forms of tender obtained at the office of the Engineer and Surveyor, Council Offices, Skelton-in-Cleveland.

Tenders enclosed in plain sealed envelopes endorsed "Electrical Installations, Brotton" or "Electrical Installations, Boosbeck" as the case may be, must be delivered to the undersigned not later than noon on Monday, April 27, 1953.

The Council do not bind themselves to accept the lowest or any tender.

F. WILKINSON,
Clerk of the Council.

Council Offices,
Skelton-in-Cleveland. (D 376)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CROWN AGENTS FOR THE COLONIES

FITTER LINESMAN required by the Government of Nyasaland Electrical Services Department for one tour of 24 to 36 months in the first instance, with prospect of permanency. Commencing salary according to age and experience in the scale (inclusive of allowances) £677 rising to £1,001 a year. Outfit allowance, £30. Free passages. Liberal leave on full salary. Candidates not over 35 years of age must have had a good general training and considerable experience of the erection, maintenance and testing of overhead distribution up to 11 kV, using steel and wood supports. They should be able to carry out all overhead line work, including tensioning, erection of switch gear, transformers, etc.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29910B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (D 347)

GOLD COAST GOVERNMENT

VACANCIES FOR ELECTRICAL ENGINEERS
Electricity Department

APPLICATIONS are invited for vacancies in the post of Electrical Engineer in the Electricity Department. Duties: Will include the complete investigation and planning of new electricity undertakings and the expansion of existing undertakings; the preparation of schedules and the supervision of contracts.

Qualifications: Candidates should be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications. They should have been regularly trained as electrical engineers and have had a wide subsequent experience with an electricity supply authority in design and construction of e.h.t. and l.t. underground and overhead distribution systems. A knowledge of compression ignition engines would be an advantage.

Terms of service: The appointments will be on contract/gratuity terms of one tour of 18-24 months with a possible extension to two tours. Salary will be in the range £810-£2,020 per annum (consolidated) according to age, qualifications and experience. A gratuity at the rate of £37 10s. (or £25, if salary less than £1,000) for each completed three months of satisfactory service will be payable on final termination of the contract.

Free passages on first appointment and on leave will be provided for the officer and his wife once each way during each tour of service. Officers will normally be required to travel by air. Free air passages will also be provided for a maximum of three children under 13 years of age.

Vacation leave with pay: Seven days for each month of service. Free medical and dental attention provided for officer and family. Furnished quarters available at low rental. Income tax at low local rates. Kit allowance on first appointment, £30-£80, according to salary. Contributions to the Widows' and Orphans' Pension Fund are at present compulsory.

These posts are "Development Posts" for implementation of specific projects under the Gold Coast Development Plan and are strictly temporary. On termination of the contract, the officer would not be eligible for transfer to any other Government appointment but would be able to apply for appointment to another post, if desired.

Intending candidates should apply to the Gold Coast Commissioner, Melbourne House, Aldwych, London W.C.2, for application form. (D 309)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following posts:—

JUNIOR ENGINEER
Little Barford Generating Station.

Salary Class "G," Grade 16, £390; Grade 14, £491 per annum.

JUNIOR ENGINEER
Peterborough Generating Station.

Salary Class "F," Grade 15, £390; Grade 14, £466 per annum.

Commencing salaries depending on qualifications and experience.

The duties of the successful applicants will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications stating age, qualifications and experience, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by April 18, 1953.

W. N. C. CLINCH,
Controller.
(D 361)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Area Board Headquarters

SECOND ASSISTANT ENGINEER
(Operational Control, Low Road)

There are two vacancies for shift Control Engineers in the new System Control Centre at Low Road, Hunslet, Leeds.

Applicants should preferably have had previous experience in a system control room and in the operation of a large h.v. system operating at voltages of 6·6, 11, 33 and 66 kV.

Corporate membership of the Institution of Electrical Engineers or equivalent qualifications will be advantageous.

Salary: N.J.B. Grade K7, £869 to £907 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, not later than April 23, 1953.

No. 6 (Hull) Sub-Area

Goole District.

FIRST ASSISTANT DISTRICT ENGINEER

Applicants should be experienced in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution networks, substation plant and ancillary apparatus.

The successful applicant will be responsible to the District Engineer and must be capable of preparing complete schemes and estimates. He will be required to reside in the Goole District and undertake standby duty.

Applicants should be corporate members of the Institution of Electrical Engineers or possess equivalent qualifications.

Salary: N.J.B. Class "D", Grade 5, £714 to £731 per annum.

Applications, giving full details of age, qualifications, and experience, should be forwarded to the Manager No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than April 23, 1953.

No. 5 (Wakefield) Sub-Area

Barnsley District.

ASSISTANT CONSUMER'S ENGINEER

Applicants, who must have had a sound practical training and a fair amount of experience in the work of a Consumers' Engineer, will be required to give advice to all classes of consumer concerning the utilisation of electricity. Experience in the interpretation of the I.E.E. wiring regulations and in tariffs will be of advantage. Preference will be given to applicants holding a Higher or Ordinary National Certificate in Electrical Engineering or some other approved qualification.

Salary: N.J.B. Class "F", Grade 10, £577 to £598 per annum.

Applications, giving full details of age, qualifications and experience should be forwarded to the Manager No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than April 23, 1953.

No. 7 (Grimsby) Sub-Area

ENGINEERING DRAUGHTSMAN

The successful applicant who should hold at least the Ordinary National Certificate will be required to prepare with a minimum of supervision drawings, specifications and bills of quantities, and should preferably have had experience of building and structural work in a drawing office.

Salary: N.J.B. Schedule "D", Grade 6, £433 to £567 per annum.

Applications, giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than April 23, 1953. (D 380)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

DEPUTY POWER STATION SUPERINTENDENT is required at Ironbridge Generating Station, Salop. N.J.B. service conditions, superannuable appointment, salary within Schedule "A," Grade "H3," commencing at £1,035 per annum.

Applicants should preferably possess a university degree in engineering or be corporate members of the Institution of Electrical and/or Mechanical Engineers. A wide knowledge of the operation and maintenance of a large generating station and sound administrative ability are essential.

Apply on forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, by April 25, 1953. (D 379)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:—

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department, North Wilford.
Vacancy No. 22/53.

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction, drainage and sanitation schemes, associated with offices and administrative buildings.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

JUNIOR ENGINEERS
Staythorpe Generating Station.
Vacancy No. 41/53.

Junior Engineers are required at Staythorpe Generating Station, where suitable young engineers will be given opportunity to obtain operating and maintenance experience in the various sections of this large generating station operating at 900°/900 lb sq in. steam conditions.

The salary will be within Class "J", Grades 17-14 (range £408 to £545 per annum) of the National Joint Board Schedule.

Preference will be given to candidates who hold the Higher National Certificate, or who are at present pursuing a course of study with the object of obtaining this or a similar qualification.

Closing date for this appointment will be April 13, 1953.

DRAUGHTSMAN
Transmission Department, Divisional Headquarters, Nottingham. Vacancy No. 42/53.

Candidates should preferably have had experience in one or more of the following: design and construction of high-voltage sub-stations or overhead transmission lines and underground cable systems. Civil engineering, electrical engineering, including layouts and diagrams for h.v. transformers and switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement Grade 6 of Schedule "D" (£433 to £567 per annum) according to qualifications and experience.

Closing date for this appointment will be April 13, 1953.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the dates stated. Please quote Vacancy No.

L. F. JEFFREY,
Divisional Controller.
(D 377)

CROWN AGENTS FOR THE COLONIES

MASTER, TECHNICAL EDUCATION (electrician), required for the Gold Coast Local Civil Service for two tours each of 18 to 24 months in first instance. Commencing salary according to age, qualifications and experience in consolidated scale £990 rising to £1,230 a year (including overseas pay). Outfit allowance £60. Gratuity up to £37/10/- for every period of three months' service. Free passages. Liberal leave on full salary. Candidates must possess an Ordinary National Certificate or a City and Guilds Final Certificate in electrical engineering, or an equivalent qualification, and have had good industrial experience.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29142.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (D 352)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 59/53—SHIFT CHARGE ENGINEER—at Agecroft H.P. Generating Station, near Manchester. Salary £729/£758 (G.7).

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before April 20. Quote vacancy number. (D 348)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 58/53—SHIFT CHARGE ENGINEER—at Stuart Street Generating Station, Manchester. Salary, £772/£802 (H.7).

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before April 18. Quote vacancy number. (D 351)

SOUTHERN ELECTRICITY BOARD

DEMONSTRATOR

SWINDON DISTRICT of No. 2 (Newbury) Sub-Area. Salary, N.J.C., Grade 1 (£380-£470 per annum). N.J.C. conditions of service.

Applicants should be women who are qualified to advise generally on the utilisation of electric domestic appliances, to give public demonstrations of apparatus, and to assist in showroom duties. The possession of an E.A.W. certificate or equivalent domestic science qualification would be an advantage.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' superannuation scheme, if eligible.

Applications, on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury, and returned to him in envelopes suitably endorsed, not later than April 20, 1953. (D 349)

BRITISH ELECTRICITY AUTHORITY

DRAWING OFFICE, Headquarters, Bankside, London, require:—

SENIOR DRAUGHTSMEN (Grades 4 and 5) and DRAUGHTSMEN (Grade 6). Candidates must have experience in power-station layout or have been employed in a power-station drawing office.

SENIOR DRAUGHTSMEN (Grade 5) and DRAUGHTSMEN (Grade 6) with experience in R.C. design and detail for light structures and foundations, required for main Grid sub-stations.

DRAUGHTSMEN (Grade 6) with experience in layout and/or protection diagrams for 132 kV sub-stations.

Senior draughtsmen should be at least 26 years of age.

Starting salaries will be in accordance with qualifications and experience, as follows: N.J.B., Grade 4, £705-£819; Grade 5, £595-£705; Grade 6, £458-£595. Pension scheme. One Saturday in four on duty. Forms from D. Moffat, Director of Establishments, Winsley Street, London W.1. Quote Ref. ET/357. (D 350)

CROWN AGENTS FOR THE COLONIES

SENIOR GENERAL ELECTRICAL ENGINEERING INSTRUCTOR required by the Mombasa Institute of Muslim Education, Kenya, for one tour of three years in the first instance with prospect of re-engagement. Salary (including cost-of-living allowance) according to qualifications and experience in scale £929, rising to £1,325 a year. Free furnished quarters or allowance in lieu. Outfit allowance £30. Free passages. Superannuation scheme. Candidates must have served an apprenticeship or pupilage to electrical engineering and have had considerable practical experience. They should be A.M.I.E.E. or G.I.E.E., or possess qualifications exempting from G.I.E.E. examination. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29814.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (D 372)

BRITISH ELECTRICITY AUTHORITY

Specifications and Contracts Branch

GENERATION CONSTRUCTION SUB-DEPARTMENT at Headquarters, London, require an ELECTRICAL ENGINEER (CONTRACTS). Salary not less than £1,500 inclusive. Candidates must be corporate members of the I.E.E. and have wide experience in connection with contracts for electrical plant and equipment for large modern power stations. Duties include critical examination of tenders and specifications for electrical plant, preparation of recommendations for placing of contracts, negotiations with contractors, settlement of claims and attendance at meetings of technical and other committees associated with this type of plant.

Applications, stating age, present salary and full details of qualifications and experience, to D. Moffat, Director of Establishments, Winsley Street, London W.1, by April 27, 1953. Quote reference ET/359. (D 353)

THE NORTH EASTERN ELECTRICITY BOARD

Tyne Sub-Area

APPLICATIONS are invited for the appointment of THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER at Tynemouth District.

Applicants should preferably be qualified engineers and have experience in all aspects of service to domestic, commercial and small industrial consumers. Salary, Schedule "A," Class "E," Grade 10, £555 to £569. N.J.B. conditions of service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, within 10 days of the appearance of this advertisement. (D 371)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable post. Salary, including London Allowance, and conditions of service in accordance with N.J.B. agreement, Schedule "A."

SHIFT CHARGE ENGINEER

Wimbledon Generating Station

Candidates should have received a sound technical training in electrical and mechanical engineering and practical experience in the running and efficient operation of power station plant. Character and ability to deal with staff problems is important. Salary: Class "E," Grade 7, £681 9s. p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Gt. Portland Street, W.1, and be received within 14 days of this advertisement. (D 373)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the positions of JUNIOR ENGINEERS at (a) Walsall, and (b) Ocker Hill Generating Stations. N.J.B. service conditions, superannuable appointments, salaries within Schedule "A," (a) Grades "G," 16 to 14, £390 to £491 per annum, and (b) Grades "F," 15 to 14, £390 to £466 per annum.

Applicants should preferably possess the Ordinary National Certificate in electrical engineering and have had experience in a large generating station. Duties will consist mainly of switchboard operation.

Apply on forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by April 25, 1953. (D 378)

BRITISH ELECTRICITY AUTHORITY require an ASSISTANT COMMERCIAL MANAGER at Headquarters in London. Candidates should have held responsible positions and have wide experience in the commercial, technical and economic aspects of electricity supply. Salary according to qualifications and experience within provisional salary range £1,575 to £2,000 inclusive.

Applications stating age, qualifications, experience and present salary to D. Moffat, Director of Establishments, Winsley Street, London W.1, by April 27, 1953. Quote reference ET/363. (D 362)

CHEMIST (aged 25-32) required by cable works, N. London area. A university degree or equivalent qualifications is essential. Preference will be given to applicants who have had experience in the manufacture of paper-insulated and/or enamelled wires. Commencing salary up to £600, according to qualifications and experience.—Reply to Box No. 2565, Electrical Times. (D 365)

DEPUTY POWER STATION SUPERINTENDENT required for service with the Sudan Light and Power Company, Limited, in Khartoum—Anglo-Egyptian Sudan. Basic salary on appointment £E.1,500 per annum (£E.1 = £1 0s. 6d.) Candidates should be between the age of 30 and 40 and must be corporate members of the Institution of Mechanical Engineers; have had not less than 10 years' experience in the design, construction and operation of modern power stations equipped with boilers and turbo-alternators operating under steam conditions up to 400 lb per sq in. pressure and 750° F. superheat; and e.h.t. switchgear and associated control equipment. Corporate membership of the I.E.E. and experience with oil fired boilers and diesel alternators up to 1,200 kW also most desirable. Evidence should be adduced of having held positions of responsibility requiring organising and administrative powers and the ability to control staff. Initially duties will include relieving the Power Station Superintendent of day-to-day administrative work in the existing diesel power station; and supervising the erection and equipping of a steam station.

In addition to basic salary, a cost-of-living allowance will be payable, and a kit allowance of £E.50 on appointment.

Appointment will be on contract up to 10 years, including a period of 12 months' probation, with a bonus payable on completion of the contractual period. Free living accommodation, with basic furniture or an allowance in lieu thereof. After satisfactory completion of the probationary period, liberal leave on full salary with free passages. There is at present no income-tax in the Sudan.

Applications, stating age, education, qualifications, experience (with particulars of posts held), present appointment and salary, with names of two referees, should be submitted to the Secretary, The Power and Traction Finance Company Limited, Queens House, Kingsway, London W.C.2. (D 375)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

CABLE INSTALLATION STAFF FOR SERVICE ABROAD

A LARGE Cable Manufacturing and Contracting Company requires the following staff for permanent service in South Africa and Australia:—

(a) Contract Engineer to take full charge of cable installation contracts.

(b) Assistant Contract Engineers for supervising cable installation contracts.

(c) Jointing Engineers to take charge of super-tension cable jointing and to train jointers.

(d) Super-tension cable jointers.

Employment will be mainly on contracts for the laying and jointing of super-tension cables of all types. Suitable applicants would undergo a period of training and probation in the United Kingdom, and confirmation of appointments abroad would follow the satisfactory completion of this period. The situations would be permanent and salary would be according to qualifications and experience.

Previous knowledge of super-tension cable contract work, particularly on oil-filled cables, would be a considerable advantage.

Apply, stating age, qualifications and experience, to **Box No. 2523, Electrical Times.** (D 250p)

CONTRACT ENGINEERS required for Switchgear Tenders and Contracts, single men preferred.—Applications giving age, training, subsequent experience and salary required to: Personnel Manager, South Wales Switchgear, Ltd., Blackwood, Mon. (D 312)

ELECTRICAL DRAUGHTSMAN required, preferably with some knowledge of resistances.—Applications, in writing, giving full particulars, to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (D 337)

ELECTRICAL layout and cabling DRAUGHTSMAN urgently required, preferably H.N.C. or O.N.C., or practical experience, for modern power station H.T. and E.H.T. cabling, switchgear, protection systems. Good salary. London office. Alternate Saturdays. Free lunches. 1953 holiday can be arranged. Good opportunities for experience. Pension fund. Quote reference E.L.D. and state age, education, training, salary required and when free.—Write Box 198, c/o Walter Judd Ltd., 47 Gresham Street, London E.C.2. (D 359)

ELECTRIC cable manufacturers and engineers, London area, require immediately SENIOR ESTIMATORS and SALES STAFF. Export experience an advantage. Good progressive positions.—State age, experience and salary required (in confidence) to Box No. 2563, Electrical Times. (D 364)

ELECTRICIANS required, skilled all classes wiring. Conditions N.J.I.C. Electricity Supply Industry; 44-hour week; present rate 3s. 6½d. per hour.—Apply, District Manager, Eastern Electricity Board, Anchor Street, Chelmsford, Essex. (D 385)

ELECTRONIC ENGINEER required for Turbine Laboratory. Should possess a degree in Electrical Engineering and previous laboratory experience in Physics, Electrical Engineering or Instrument Technology would be an advantage.—Send details of qualifications, experience and salary required to: The Personnel Officer, Sir George Godfrey and Partners, Ltd., Hampton Road West, Hanworth, Middlesex. (D 314)

ENGINEERS with initiative required for team making detailed study and preparing scheme for planned development of large integrated works producing pig iron and chemical products. Honours University Degree desirable and/or membership of professional institutions. Wide practical experience of works' layout and techniques essential. Some administrative experience desirable. Location London, but work will involve travelling. Salaries according to experience, age and qualifications.

EL. OR MECHANICAL/MECHANICAL ENGINEERS, with special experience of calculations on power generation and distribution for the modernisation of a complex works' power system services, etc.

Apply immediately, giving full details of experience, age, qualifications, and salary required, to Box No. 2533, Electrical Times. (D 279)

EXPERIENCED TECHNICAL SALES and CONTRACTS ENGINEER required as direct assistant to Sales Manager. Situation calls for knowledge of rotating electrical equipment, handling of correspondence and office procedure. Age 30 to 40 years. Salary in accordance with experience and qualifications. Successful applicant will have opportunity of joining the company's pension scheme for senior staff.—Apply, giving full details, to Personnel Manager, Small Electric Motors, Ltd., Eagle Works, Churchfields Road, Beckenham, Kent. (D 345)

FLEXIBLE MOULDED RUBBER ELECTRICAL CONNECTORS. A large electrical firm, N. London, requires a TECHNICIAN to work on all aspects of the design and manufacture of these products. Applicants who have not had experience in this particular field will be considered if they have worked on the design and mass production of small moulded rubber products. The resources of a large cable and rubber works are available. The position offers excellent prospects to a person who is able to develop this new line of manufacture in a large organisation.—Reply to Box No. 2549, Electrical Times. (D 325)

JOINTER (E.H.T.) required by London Electricity Board at Willesden, N.W.6. Applicants should be capable of connecting all classes of cable, including extra high tension. N.J.I.C. conditions. Rates of pay: 3/10½ per hour (£8/10/6 per 44-hr. 5-day week).—Application forms from Establishments Officer, 46 New Broad Street, London E.C.2. Please enclose addressed envelope and quote ref. M/2108/T on all correspondence. (D 354)

LABORATORY ASSISTANTS for the development of instruments, meters and relays. University Degree or Higher National Certificate standard required.—Apply in writing, stating age, experience and salary required etc., marking envelopes "Meter Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (D 383)

MACHINERY MERCHANTS require ENGINEERS to take charge of department handling purchase and sale of used motors. The successful applicant must be regularly trained and with specialist knowledge of the trade, able to conduct all aspects of this work, including organisation of a large stock and execution of orders from start to finish. Replies should give fullest particulars of training and career to date and will be held in strictest confidence. Tenable London.—Write, Box No. 2543, Electrical Times. (D 304)

MANAGER required for Service and Maintenance Division of large well-known radio and electronic engineering concern with headquarters in London. This is a very senior post involving the control of several existing servicing departments and organisations at home and overseas, and development of further organisations to meet special needs. Applicant should have first-class administrative record. Engineering qualifications and experience in radio, electrical or light engineering an advantage.—Applications, in writing, giving particulars as to age, education, qualifications, previous experience, and present salary, together with names of two persons who can speak from recent personal knowledge of applicant and to whom reference may be made, to Box No. 2571, Electrical Times. (D 368)

PHYSICIST, Electrical Engineer or Chemist required by large firm of cable makers and electrical engineers for responsible technical and development work on rubber and plastic cables of all types.—Applicants should preferably have had previous experience with low-voltage power and lighting cables. This is a senior post offering considerable scope for a man with outstanding qualities. Reply to Box No. 2569, Electrical Times. (D 307)

QUALITY CONTROL SUPERVISOR for manufacture of paper insulated power cables up to high voltages. At least National Certificate standard with knowledge of power cable materials. Previous manufacturing experience an advantage. Age 22 to 30 years. Good salary with prospects.—Apply in writing to Staff Officer, British Insulated Callender's Cables, Ltd., Belvedere, Kent. (D 296)

REPRESENTATIVES for selected territories required by well-known manufacturers of cables, cords and harnesses. Applicants must have personal connection with manufacturers of domestic and industrial appliances, telecommunications apparatus, etc.—Write full details, which will be treated in strict confidence, to Box No. 2513, Electrical Times. (D 245)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

REPRESENTATIVE required to cover the South West of England and South Wales. This is an interesting post offering scope for enterprise. Pension scheme. Applicants should be car owners and have good contacts throughout the area.—Apply in confidence to the Sales Manager, M.K. Electric Ltd., Wakefield Street, London, N.18. (D 341)

SALES MANAGER required by prominent manufacturing company in the lighting industry. The position involves control of sales force in London and Provinces and requires considerable knowledge of sales techniques and experience in selling in a highly competitive field. —Applications, giving full details of past career should be sent in confidence to Box A.577, c/o Central News, 17 Moorgate, E.C.2. (D 360)

SENIOR ELECTRICAL CONTRACTS ENGINEER required for East Africa. Must be experienced in the supervision of Contracts Department covering in particular industrial installations and multi-storeyed buildings, and be capable of preparing large estimates and schemes for this type of work. Salary approximately £1,100 to £1,400 per annum, depending on experience.—Write Box 218, c/o Walter Judd Ltd., 47 Gresham Street, London E.C.2. (D 374)

SUPERFINE WIRE. We are wanting an experienced TECHNICAL MAN, with intimate knowledge of the trade, for the development of nickel and nickel-alloy superfine wire for home and abroad. Ample scope and opportunity for advancement.—Give full details of technical and commercial experience, age, salary required: Box No. 2567, Electrical Times. (D 366)

TOOL DESIGNER with first-class experience of modern methods and progressive tooling in press-shop and with knowledge of jig and fixture design required by leading manufacturer of light domestic and industrial switches and thermostats. Appointment would be of senior status and with prospects.—Write in confidence, giving full details of career to date and present salary to Box No. 2535, Electrical Times. (D 285)

TRANSFORMER DRAUGHTSMAN required for units up to 500 kVA, 22 kV.—Write stating age, salary required and previous experience. Thermocontrol, 2-10 Valentine Place, Blackfriars Road, S.E.1. (D 358)

£50 a year TAX FREE bounty is paid to electronic artificers joining special section of the Army Emergency Reserve. Men with City and Guilds Final Certificate in Telecommunications and Radio and up-to-date experience in current electronic engineering practice will be needed to maintain electronic instruments controlling fire of anti-aircraft guns which protect vital centres of Great Britain should war break out. By joining the A.E.R. a man will not only be playing a vital part in the defence of this country, but will also know his exact role in the event of war. Minimum rank, Staff Sergeant. Minimum of 15 days training per year with Regular Army rates of pay in addition to bounty.—Further details from D.D.M.E., Anti-Aircraft Command, "Glenthorn," Stanmore, Middlesex, or the War Office (A.G.10/EA4), London S.W.1. (D 24)

APPOINTMENTS WANTED

POSITION desired as SALES MANAGER or LONDON AREA MANAGER. 25 years in electrical industry. Rotating plant of all types with associated electrical equipment. Detailed experience of industrial applications, special drives, private generation, control and switchgear installation, welding plant, etc. Apprenticeship and training with leading manufacturing company. Twelve years' experience as area manager.—Box No. 2503, Electrical Times. (D 197)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (D 15)

ARMATURE REWINDING SERVICE to the Trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors, Vacuum Cleaner and Drill Armatures replaced from stock. 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. —Regam Electric Cleaner Service, 95-97 Park Lane, Leeds 1. (D 297)

FISHER FOUNDRIES, LTD., Greet, Birmingham, have immediate capacity for machine moulded PRECISION CASTINGS in gunmetal and grey iron, ¼ to 30 lb. All castings shot blasted.—Telephone: Birmingham Victoria 0197. (D 21)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (D 36)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (D 9)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (D 5)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (D 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water tube boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath, Staffs. (D 2)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (D 7)

WANTED. 22 yd. ·0225, 4-core P.I. lead covered CABLE. Double wire armoured, served and compounded overall. 660 V. New.—Box No. 2561, Electrical Times. (D 363)

AGENCIES

M.A.A.—THE BADGE OF A GOOD MANUFACTURERS' AGENT. Manufacturers requiring reputable Agents are invited to communicate with the Secretary, The Manufacturers' Agents Association of Great Britain and Ireland (Inc.), Rosebery House, 8 Breams Buildings, London E.C.4. Membership available to established agents only. Particulars supplied. (D 5)

FOR SALE

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INDEX TO ADVERTISERS

Aerialite, Ltd. 5
Alton Battery Co., Ltd.... ... 59
Aluminium Wire & Cable Co., Ltd. 3
Ashdowns, Ltd. 70
Associated Technical Manufacturers, Ltd. 13
Attwater & Sons, Ltd. 72
Automatic Light Controlling Co., Ltd. 72

Babcock & Wilcox, Ltd. ... 1
British Die Casting & Engineering Co., Ltd. 67
British Driver-Harris Co., Ltd. ... 68
British Electric Lamps, Ltd. ... 62
British Insulated Callender's Cables, Ltd. 31
British National Electrics, Ltd. ... 8
British Thomson-Houston Co., Ltd. 6, 78
Brook Motors, Ltd. 21
Brush Electrical Engineering Co., Ltd. 61
Burco, Ltd. 70

Cable Makers Association ... 15
Chamberlain & Hookham, Ltd. 44
Cox Walkers, Ltd. 74
Crabtree, J. A., & Co., Ltd. ... 37
Cressall Manufacturing Co., Ltd., 4
Crompton Parkinson, Ltd. ... 39

Dorman & Smith, Ltd. ... 18, 66
Dynamo & Motor Repairs, Ltd. 57

East London Mica Works ... 66
Edison Swan Electric Co., Ltd. ... 28
Enfield Cables, Ltd. 75
Engel & Gibbs, Ltd. 16
English Electric Co., Ltd. 27, 65
Enthoven Solders, Ltd. 76
Essex Partners, Ltd. 16
Evershed & Vignoles, Ltd. ... 48

Ferranti, Ltd. 20
Foster Transformers, Ltd. ... 71

General Cable Manufacturing Co., Ltd. 26
General Electric Co., Ltd. ... 46
Grelco, Ltd. 74

Harboro' Rubber Co., Ltd. .. 54
Heatrae, Ltd. 9
Henley's, W.T. Telegraph Works, Co., Ltd. 47
Higgs Motors, Ltd. 10

Ivor Power Speciality Co., Ltd. 29
Johnson & Phillips, Ltd.... ... 43

Lancashire Dynamo Switchgear, Ltd. 40
Low, Duncan, Ltd. 4

Marryat & Place, Ltd. 16
Martindale Electric Co., Ltd. ... 56
Metropolitan Electric Cable & Construction Co. Ltd. ... 55
Metropolitan Plastics, Ltd. ... 19
Metropolitan-Vickers Electrical Co., Ltd. 34
Metway Electrical Industries, Ltd. 24
Midland Electric Manufacturing Co., Ltd. 7
Morley's Electrical Services, Ltd. 58

Nalder Bros. & Thompson, Ltd. 22
Newton Bros. (Derby), Ltd. ... 62
New Switchgear Construction Co., Ltd. 64
Nife Batteries, Ltd. 32

Parmiter Hope & Sugden, Ltd. ... 77
Partridge Jones & John Paton, Ltd. 63
Partridge Wilson & Co., Ltd. ... 35
Phillips Control (G.B.), Ltd. ... 74
Process Control Gear, Ltd. ... 74

Rainsford & Lynes, Ltd.... ... 64
Resistances, Ltd. 58
Reyrolle, A., & Co., Ltd. ... 69
Rowlands Electrical Accessories, Ltd. 73

Sanders William & Co. (Wednesbury), Ltd. 58
Saxonia Electrical Wire Co., Ltd. 72
Scholes, Geo. H., & Co., Ltd. ... 42
Scottish Cables, Ltd. 11
Shell Mex & B.P., Ltd. 41
Sifam Electrical Wire Co., Ltd. ... 72
Simmonds & Stokes (Niphan) Ltd. 60
Simplex Electric Co., Ltd. ... 2
Smart & Brown (Engineers), Ltd. 68
Smith, Frederick, & Co.... ... 36
Standard Telephones & Cables, Ltd. 23
Sunvic Controls, Ltd. 25

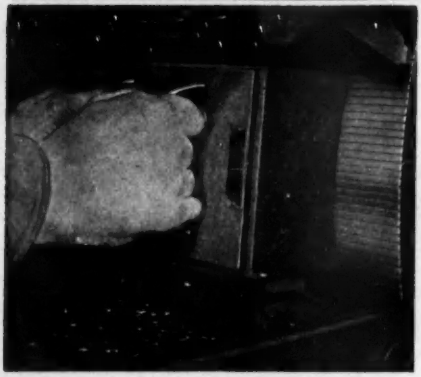
Thames Wire & Cable Co., Ltd. 33
Thorpe, F. W., Ltd. 24
T. M. C.-Harwell (Sales), Ltd. ... 30

Uni Tubes, Ltd. 4

Venner, Ltd. 17
Volex Electrical Products, Ltd. ... 14

Westinghouse Brake & Signal Co., Ltd. 12
Wootton & Co., Ltd. 60

Yorkshire Switchgear & Engineering Co., Ltd. 38



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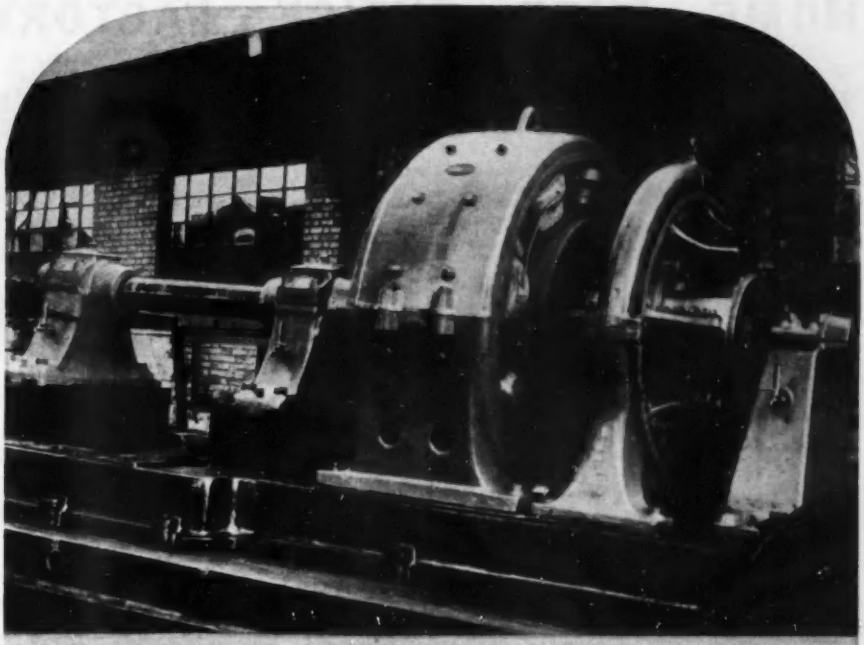

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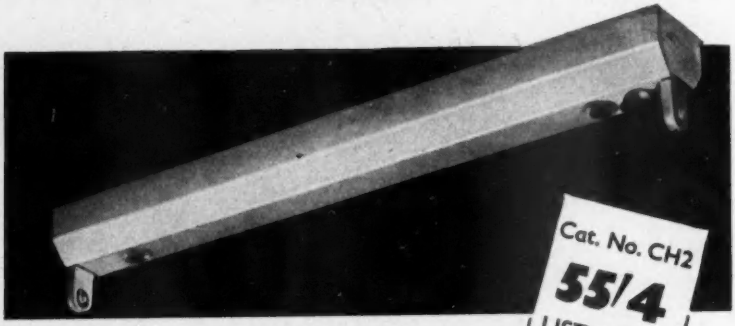

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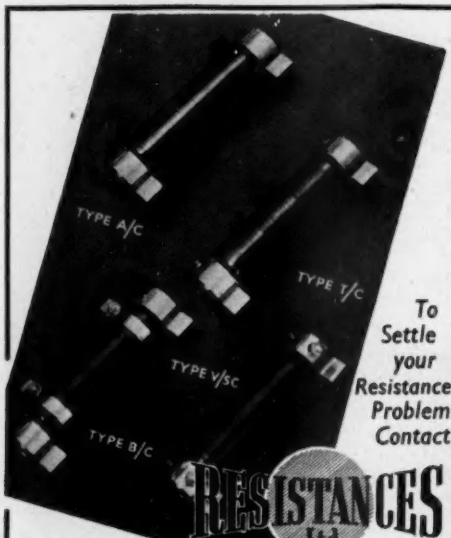

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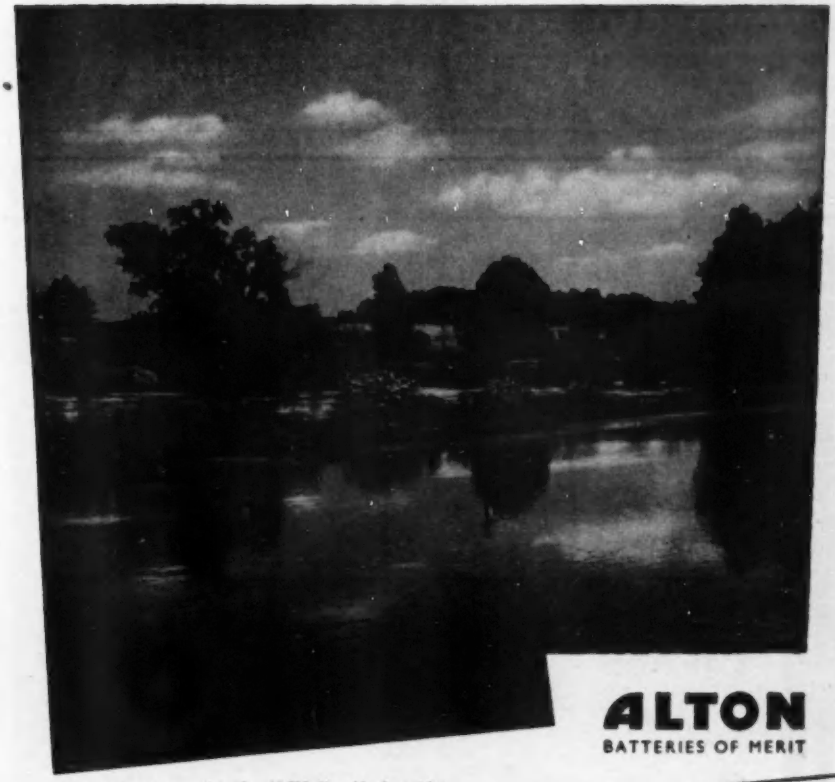

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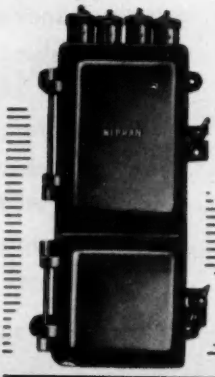

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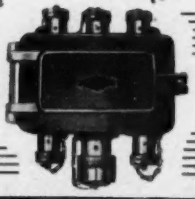

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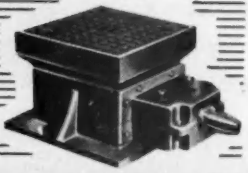

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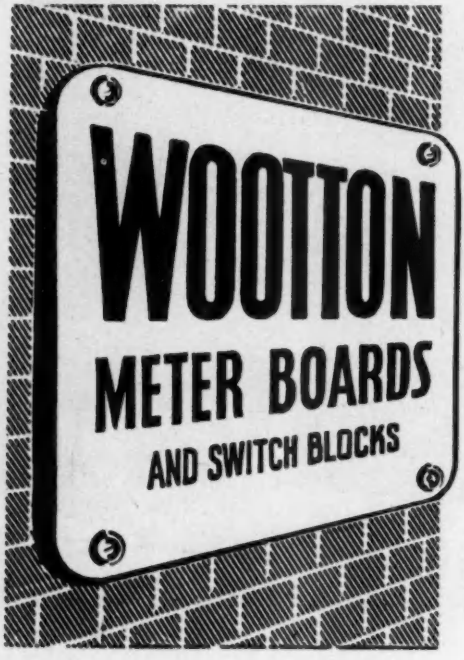

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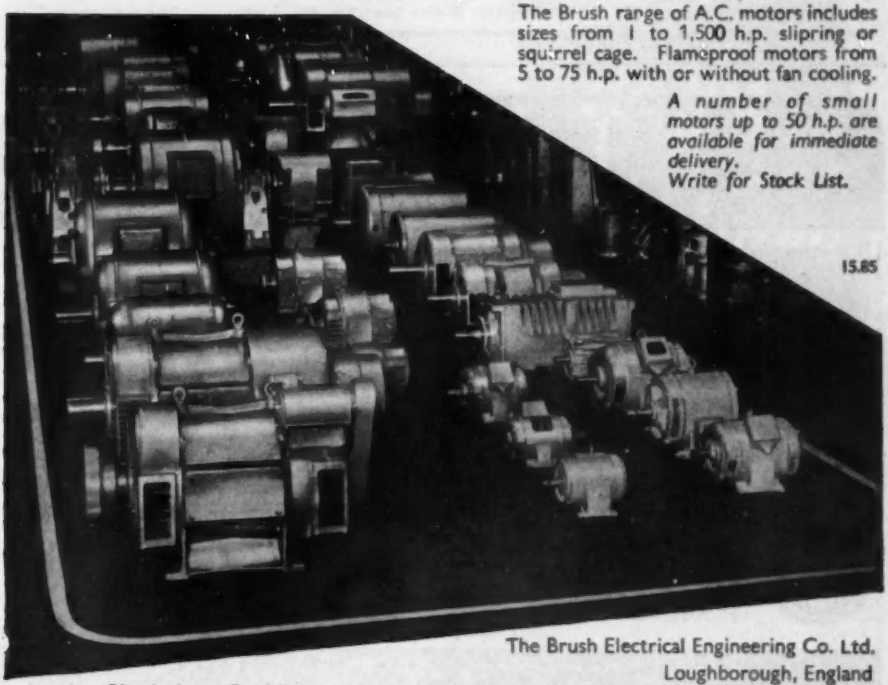

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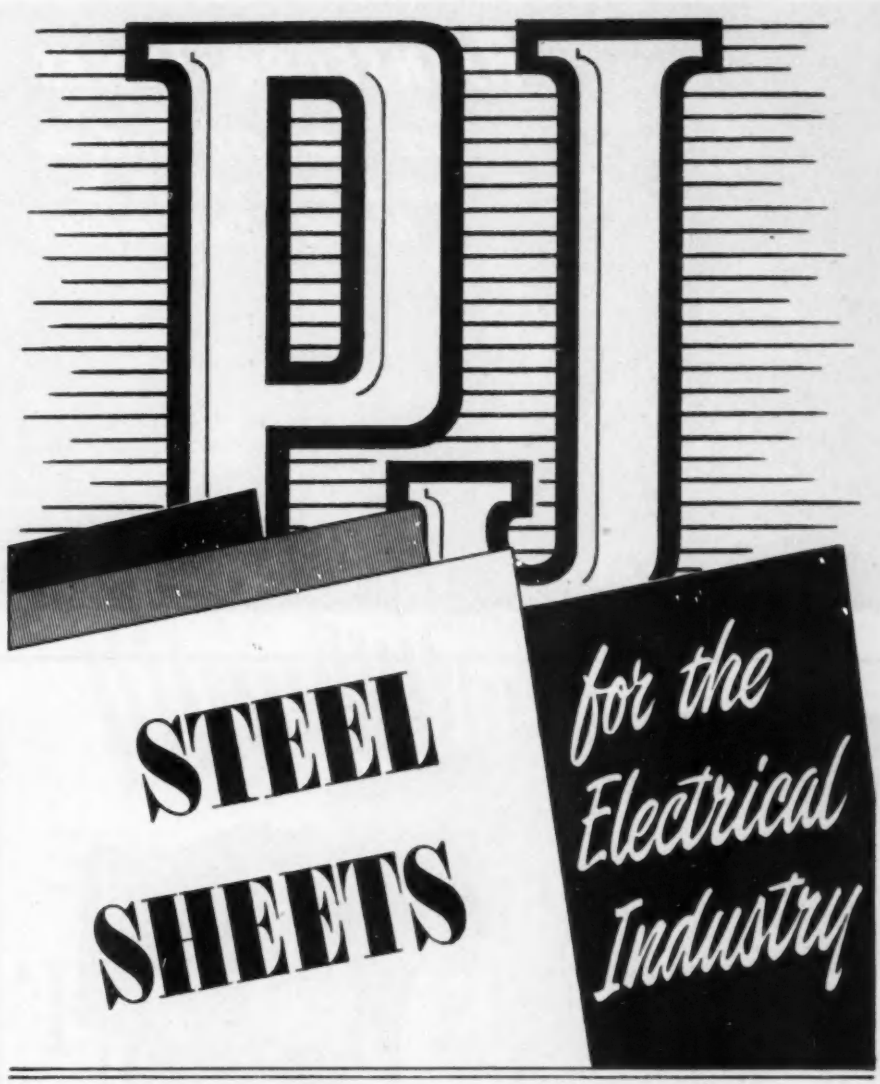

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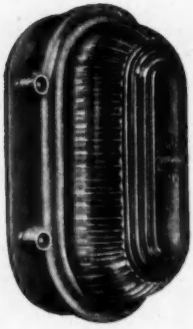

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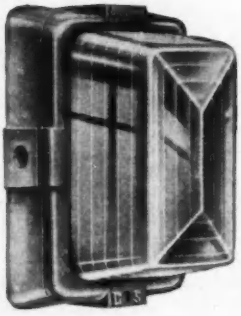

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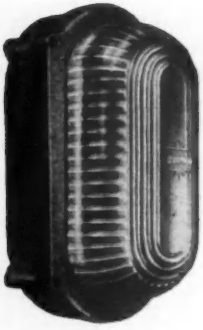

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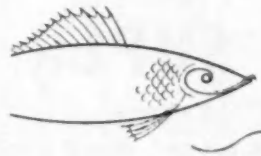

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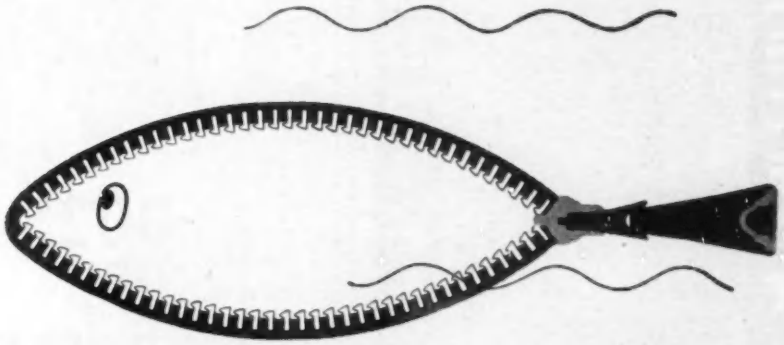

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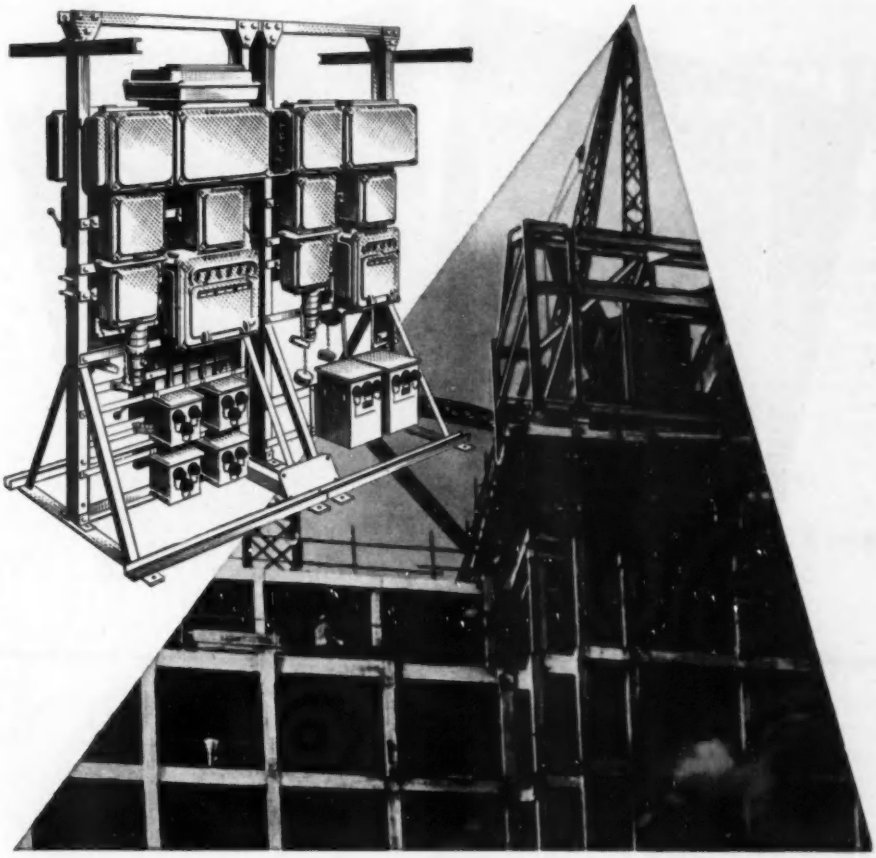

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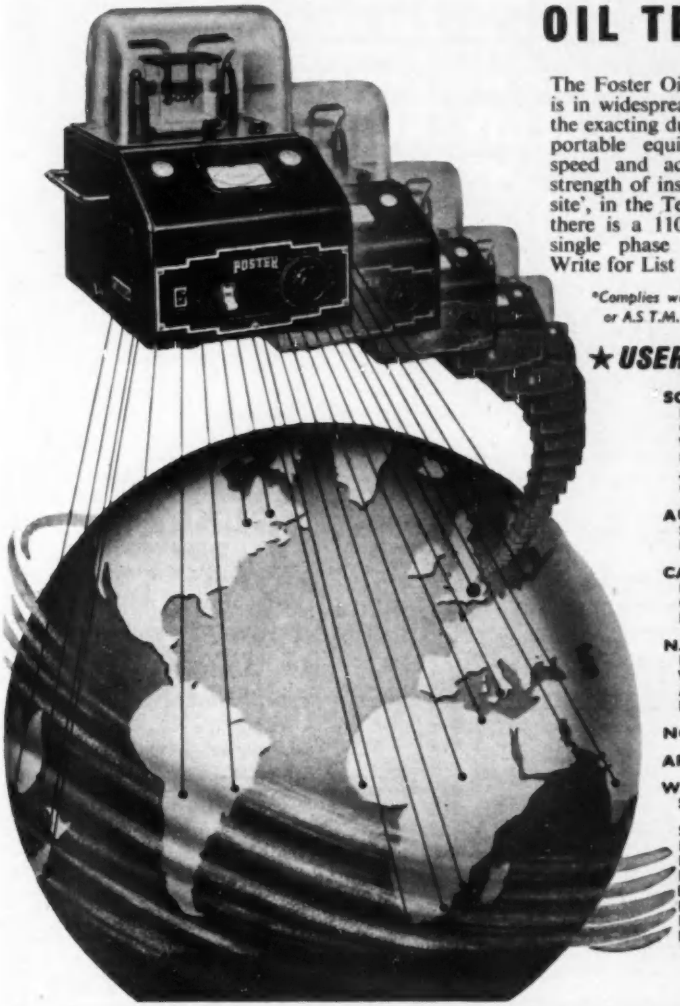

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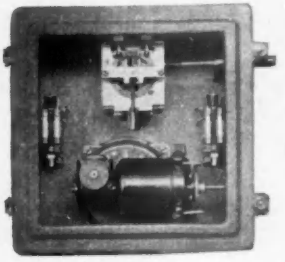

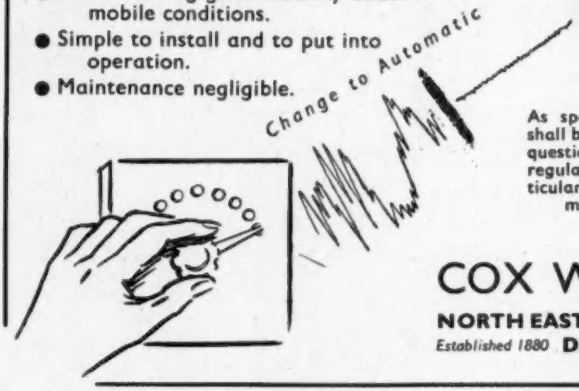

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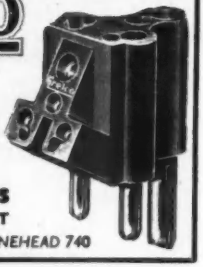

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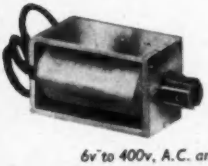

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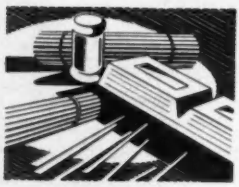

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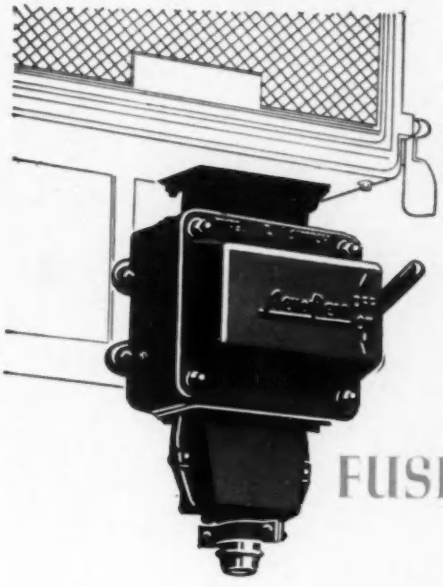

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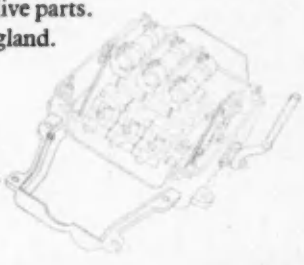

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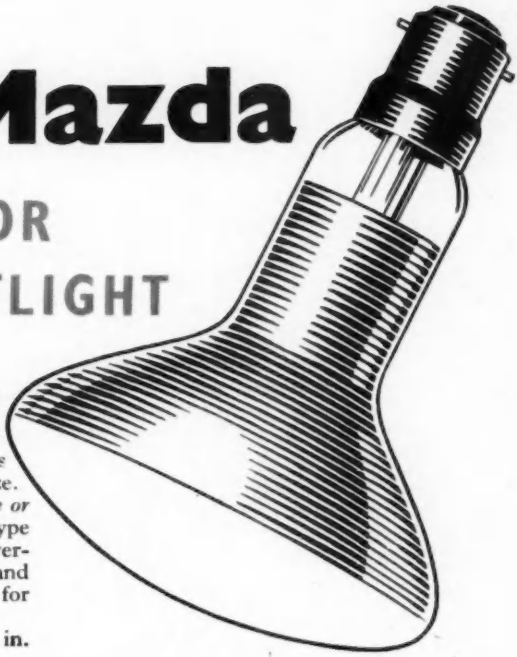

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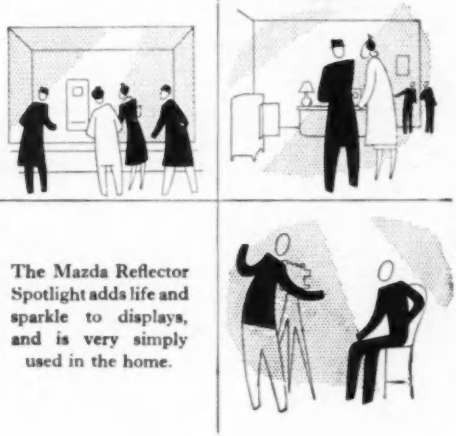

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